

INITIAL STUDY

The Department of Toxic Substances Control (DTSC) has completed the following Initial Study for this project in accordance with the California Environmental Quality Act (§ 21000 et seq., California Public Resources Code) and implementing Guidelines (§15000 et seq., Title 14, California Code of Regulations).

I. PROJECT INFORMATION

Project Name: Enhanced In Situ Bioremediation of Chlorinated Solvent Plume at Installation Restoration Site 70, Naval Weapons Station Seal Beach

Site Address: 800 Seal Beach Boulevard

City: Seal Beach State: CA Zip Code: 90740 County: Orange County

Company Contact Person: Pei-Fen Tamashiro

Address: Naval Weapons Station Seal Beach; 800 Seal Beach Boulevard

City: Seal Beach State: CA Zip Code: 90740 Phone Number: (562) 626-7897

Project Description:

Under the California Health and Safety Code, section 25356.1, the Department of Toxic Substances Control (DTSC) proposes to approve a Proposed Plan/Draft Remedial Action Plan (RAP) for groundwater treatment using enhanced in situ bioremediation of the chlorinated solvent plume at Installation Restoration (IR) Site 70 (Site), Naval Weapons Station, Seal Beach (NWSSB). The Final Revised Groundwater Feasibility Study Report, Installation Restoration Program, Site 70, Naval Weapons Seal Beach is incorporated by reference.

Location: The NWSSB is located in Seal Beach in the County of Orange, California. Nearby municipalities include Los Alamitos to the north, Westminster and Huntington Beach to the east, and Long Beach to the west. The Pacific Ocean borders NAVWPNSTA Seal Beach to the south. Please refer to the attached figures at the end of this document: Figure 1, Site 70 Location and Regional Conditions Map; Figure 2, Wells Within a 1.5 Mile Radius of Naval Weapons Station; Figure 1-1, Regional Map; and Figure 2-1 IR Site 70 Base map.

Background/History:

The NAVWPNSTA Seal Beach was originally commissioned in 1944 at the height of World War II as a Naval Ammunition and Net Depot. It is one of several weapons stations maintained by the Navy to provide fleet combatants with ready-for-use ordnance. The Station includes a headquarters with central and administrative support detachments as well as storage, testing, and production facilities that support the Station's mission. The Station serves as a supply point for half of the Navy and Marine Corps forces operating in the Pacific region. Past hazardous waste disposal practices at the Department of Defense (DoD) installations resulted in the release of pollutants into the environment. Since 1975, the DoD has been investigating and cleaning up these pollutants through the Installation (IR) Programs.

Installation Restoration (IR) Site 70 is the former National Aeronautics and Space Administration (NASA) Research, Testing, and Evaluation (RT&E) Area on Naval Weapons Station Seal Beach (NAVWPNSTA Seal Beach). The area consists of multistory office and production buildings, asphalt-paved parking areas, an assortment of aboveground tanks and attendant above-and below-ground piping distribution systems, several concrete-lined sumps, and underground storage tanks (USTs). From 1962 to 1973, NASA used the area for the design and manufacture of the Saturn II launch vehicle for the Apollo Program. Subsequent to NASA leaving the area, the United States Department of Energy and Garrett Engineering (Allied Signal) conducted pilot test assembly operations for a classified uranium enrichment process in portions of Building 112 (S-03). These tests were conducted from 1980 to 1985 but did not include either the manufacture or enrichment of uranium. Currently, the building is used for storage, communications research, and office space.

Chemicals used included industrial solvents, primarily volatile organic compounds (VOCs), lubricating oils, and detergents in the manufacturing process. This resulted in contamination to groundwater under IR Site 70. The primary VOC at the Site is trichloroethene (TCE). Other VOCs present are chloroform, dichloroethane (DCA), dichloroethene (DCE), tetrachloroethene (PCE), and vinyl chloride. Extensive field investigations and laboratory analyses of soil and

groundwater have been conducted. Human health and environmental risk assessments have also been performed. The risk screening assessment determined that potential risks from exposure to contaminants in soil and groundwater at Site 70 may exist.

In 1993, a Preliminary Assessment (PA) of Site 70 was conducted and ten Areas of Concern (AOCs) were identified based on historical activities, use of chemicals at the Site, and the likelihood of a potential threat to human health and the environment. AOCs were designated for various areas. This PA identified the major chemicals of concern and recommended further evaluation at Site 70 to assess the presence of these contaminants. In 1996, a Removal Site Evaluation (RSE) was conducted to address potential waste sources. During the RSE, an additional AOC was designated for soil, for a total of 11 areas of concern (AOCs). Of the 11 AOCs, four (4) pertained to soil, and the remaining seven (7) AOCs are associated with site stuccoes (that is, tanks, piping systems, other associated structures) at Site 70. The RSE report recommended that the tanks, piping systems, and associated structures be decommissioned after these AOCs were removed from the IR program after cleanup.

In 1998, an Extended Removal Site Evaluation (ERSE) was conducted at Site 70 to supplement data from the previous investigations. The ERSE was a comprehensive investigation that served as the Remedial Investigation and to investigate hazardous waste sites. The ERSE included soil and groundwater sampling and provided information that enabled the Navy to better define the nature and extent of soil and groundwater contamination and assess potential threats to human health and the environment. During the ERSE, the Navy performed the following: geophysical survey, soil gas survey, and soil and groundwater sampling. The ERSE information refined understanding of the subsurface conditions and the migration of the TCE plume and chemicals in groundwater. Aquifer testing was performed at Site 70 in 1998 to further characterize hydrogeologic properties of the shallow aquifer underlying the source area and develop a groundwater flow computer model. Between November 1998 and 1999, a pilot test was conducted in the source area to assess the effectiveness of contaminant removal by continuous pumping. Data obtained from the aquifer and pilot tests were used in the development of remedial cleanup alternatives. Based on recommendations in the ERSE, groundwater sampling was performed to monitor the VOC plume at Site 70 and to further define the extent of metals (hexavalent chromium and mercury) in groundwater pursuant to the "Final Work Plan for Long-Term Groundwater monitoring at Installation Restoration Sites 40 and 70, NAVWPNSTA Seal Beach." Eleven new groundwater monitoring wells were installed, and the closest of the Navy's former water supply wells Navy Well No. 2, was permanently sealed off. Samples were analyzed for VOCs and natural attenuation parameters to determine if natural conditions and processes occurring in the groundwater were capable of reducing concentrations of contaminants.

The soil sampling results from additional investigations including the Remedial Investigation (RI) indicated that most of the original releases of VOCs have moved into the groundwater or evaporated into the air. Based on the environmental studies and risk screening assessment, it was determined that no cleanup action is necessary for soil at IR Site 70. Although there is no immediate threat to human health or the environment from groundwater at the Site, the ERSE report recommended further action to address groundwater at IR Site 70 because cumulative human-health risk exceeded the generally acceptable range as defined by the National Contingency Plan (NCP).

Aquifer testing was performed at Site 70 in August to September 1998 to further characterize the saturated zone and provide data to support evaluation of remedial alternatives. Two extraction wells and five piezometers were installed, and step drawdown tests were performed in the extraction wells. A constant discharge rate pumping test was also performed in the shallow groundwater well. Groundwater samples were collected during pumping tests. From November 1998 to February 1999, BNI conducted a shallow groundwater pilot test at IR Site 70. The pilot test consisted of pumping 2.5 gallons per minute from a well near the contamination source for three (3) months. The saturated zone was characterized by determining the contaminant concentration distribution before and after the pilot test and defining the effective pumping radius of influence and groundwater parameters.

Contaminated groundwater at IR Site 70 is present in two distinct phases, which comprise the VOC plume, including the source area within the shallow groundwater zone and the dissolved phase plume that extends from around the source area to the leading edge of the plume. Groundwater sampling results indicated that the source area is contaminated with TCE and other VOCs. The high concentrations of contaminants in the source area are indicative of what is known as dense non-aqueous phase liquids (DNAPL). The presence of DNAPL is critical because the pure phase liquid continues to dissolve and produce a continuing source of VOCs into the dissolved phase plume. The dissolved phase plume area is the larger, remaining portion of the plume that contains TCE and VOCs that have dissolved in groundwater and are present at lower concentrations. The lateral extent of the plume is approximately 2,400 feet long by 2,000 feet wide and approximately 195 feet deep.

Concentrations of VOCs in groundwater exceed the state and federal primary maximum contaminant levels (MCLs).

Cleanup of groundwater is recommended at IR Site 70 because TCE and other VOCs were reported in groundwater at concentrations that could result in adverse effects to human health if this water was extracted from the ground and used for domestic purposes such as drinking or bathing. However, the affected groundwater is not used for such purposes due to naturally occurring salinity levels and hard mineral concentrations. Yet cleanup is necessary to control migration and reduce concentrations of VOCs in groundwater to levels that are protective of human health and the environment and in compliance with applicable water quality standards. The proposed remedy for IR Site 70 is Alternative 11, in situ treatment, enhanced bioremediation.

For the dissolved phase plume area, Alternative 11 would involve creation of bioactive zones or biobarriers that transect the plume and treat VOCs as they migrate through. The biobarriers would be created by injecting an electron donor (emulsified vegetable oil or EVO and halorespiring bacteria (KB-1tm) into the subsurface to stimulate the bacteria to biodegrade VOCs into ethene, the non-toxic end-product of dechlorination. This process is referred to as bioaugmentation.

For the source area, Alternative 11 consists of bioaugmentation, which is the injection of EVO and halorespiring bacteria into the subsurface to dechlorinate VOCs to achieve enhanced dissolution and removal of DNAPL and accomplish remedial goals.

The project is anticipated to commence in September 2006. The construction phase is anticipated to take four (4) weeks for Phase I this year and for Phase II, another four weeks next year. The operations and maintenance phase is expected to last approximately 15 years.

As mentioned previously, NAVWPNSTA, Seal Beach conducted field investigations and laboratory analyses of soil and groundwater. Assessment for potential risks to human health and the environment has also been conducted. This risk screening assessment determined that potential risks from exposure to contaminants in soil and groundwater may exist. The soil sampling results from investigations, including the Remedial Investigation (RI) indicated that most of the original releases of VOCs have already moved into the groundwater or evaporated into the air. Based on the environmental studies and risk screening assessment, it was determined that no cleanup action is necessary for soil at Site 70.

Health Risk Discussion:

Four chlorinated volatile organic compounds (VOCs) are chemicals of concern (COCs) at IR Site 70: 1,1-dichloroethene, TCE, vinyl chloride, and chloroform. The remedial technologies have been evaluated based on their ability to address these VOCs. These constituents were identified based on their contribution to the screening-level carcinogenic risk for tap water and frequency of occurrence at the Site. The total cancer risk associated with groundwater at IR Site 70 was estimated at one in one million (1.2×10^{-1}) using U.S. EPA tap water Preliminary Remediation Goals (PRGs). Chlorinated VOCs contribute 98.5 percent of the total carcinogenic risk according to the report of BNI, 1999a.

COCs, cleanup goals, and corresponding maximum reported concentrations are provided below:

| Chemical VOC | Goal: California Maximum Contaminant Level (MCL) Cleanup Goal Micrograms per liter (ug/L)a,b | Goal: United States Environmental Protection Agency(U.S. EPA) a,b | Reported Maximum Concentration Micrograms per liter (ug/L) |
|---|--|---|--|
| Chloroform | 100 | 100 | 460 |
| 1,1-dichloroethane (DCA) | 5 | 7 | 159 ^c |
| 1,1-dichloroethene (DCE) ^d | 6 | 7 | 299 |
| Cis-1,2-dichloroethene (DCE) ^d | 6 | 70 | 50,900 ^c |
| Trans-1,2-dichloroethene (DCE) ^d | 10 | 100 | 2,600 ^c |
| Tetrachloroethene (PCE) | 5 | 5 | 3,940 ^c |
| Trichloroethene (TCE) | 5 | 5 | 837,000 |
| Vinyl Chloride | 0.5 | 2 | 960 |

Notes:

- Federal and state cleanup standards are established by the U.S. EPA Safe Drinking Water Act in Title 40 Code of Federal Regulations, Section 141 and State cleanup standards are established by the California Code of Regulations, title 22, sections 64439 and 64444.

- b. All values are reported in micrograms per liter.
- c. Chemical not identified as a risk driver during the ERSE, but added as a COC because it was reported at IR Site 70 at concentrations above the MCL.
- d. Variations of the compound, DCE.

Although the Extended Removal Site Evaluation (ERSE) sampling results showed metals exceeding background levels (BNI, 1999a), metals were ruled out as COCs at IR Site 70 because:

- metals are concentrated in the heavy use areas of the RT&E facility;
- single occurrences of metals reported above the statistical background were isolated;
- naturally occurring metals, such as copper, iron, manganese, and arsenic, are widespread, and their range of concentrations can largely be attributed to various organic and inorganic adsorption mechanisms; and
- the cancer and noncancer risk drivers at IR Site 70 are overwhelmingly chlorinated volatile organic compounds (VOCs).

No ecological risk screening was performed for groundwater because there is no pathway for plants and wildlife to come into contact with groundwater.

For the purposes of this remedial action, the area to be addressed corresponds to the footprint of the TCE plume at IR Site 70 (Figures 2 and 2-1). Because of the levels of contamination encountered, the affected media (i.e., groundwater) will be addressed as two separate areas within the plume:

- a suspected dense nonaqueous-phase liquid (DNAPL) area and
- a dissolved-phase plume.

Figure 1 shows the suspected DNAPL area. This area corresponds to the 10,000 µg/L isocontour of TCE at the less-than-35-foot depth interval. It is assumed to extend to approximately 50 feet below ground surface (bgs). The corresponding area at the surface is approximately 5,700 square feet, and the total volume (all media) is approximately 285,000 cubic feet (10,600 cubic yards). The area of the dissolved-phase plume is approximately 2,500 by 1,000 feet at its largest footprint in the 75- to 110-foot-bgs depth interval (Figure 1).

As previously discussed, the selected remedy for groundwater at IR Site 70 is enhanced *in situ* bioremediation, monitored natural attenuation (MNA), and land-use controls. *In situ* enhanced bioremediation promotes degradation of VOCs into harmless end-products. The dissolved phase plume will be segmented through the installation of injection wells that are perpendicular to the axis of the groundwater flow direction (i.e., biobarriers). The VOCs would be treated as they migrate through these biobarriers which transect the plume. The biobarriers would be created by the addition of a slow release electron donor (emulsified vegetable oil [EVO]), which would be immobile relative to groundwater flow, and the injection of requisite halorespiring microorganisms contained in a stable commercially-available culture called KB-1™. The injection of a microbial culture, referred to as bioaugmentation, is required when the key halorespiring strains of the bacterium are absent or too poorly distributed to allow bioremediation to achieve complete dechlorination to non-toxic end-products and to meet remedial goals in a timely fashion. The EVO would be metabolized to produce the hydrogen needed by the halorespiring bacteria that breakdown chlorinated VOCs. The Navy will implement enhanced bioremediation in the source area through a grid of injection wells that will contain and treat the plume from the perimeter of the source area initially and subsequently into the highest source area. For the source area, bioaugmentation will be conducted through the injection of EVO and halorespiring bacteria (KB-1™) into the subsurface to create anaerobic conditions, provide electron donor and microbial consortia to dechlorinate the VOCs, and accomplish the remedial goals in a reasonable timeframe.

In situ groundwater remediation addresses the risk posed by VOC contamination (which can be characterized as the primary threat at IR Site 70) by degrading VOCs to harmless by-products, thus permanently destroying the contaminants and significantly reducing the toxicity, mobility, and volume of hazardous substances in groundwater. Land-use controls are necessary to protect the integrity of the groundwater application and monitoring wells and associated piping and equipment. Land-use controls are also necessary to prevent use of contaminated groundwater until remediation is complete.

Project Activities:

- Construction, operation, and maintenance of groundwater monitoring and injection wells (that is, within the DNAPL source area and biobarriers): In the DNAPL source area, project implementation would employ a grid of standard two (2)-to-four (4) inch diameter wells installed using a hollow stem auger to a depth of 50 feet below

ground surface (bgs) to deliver the oil emulsion and bacterial culture to the aquifer. Each well will be screened between 35 and 50 feet bgs using v-wrapped screens. Treatment is estimated to occur over a 200 by 300 foot area. Assuming a 13 foot radius of influence during injection of the EVO, approximately 48 wells will be required. In addition to the source area, impacted groundwater has migrated toward the northern site boundary. Biological treatment to contain the source area would be achieved by injecting electron donor along an approximate 200 foot length of the northern site boundary that would require approximately nine (9) additional injection wells for a total of 57 wells for the source area. EVO would be delivered to the source area to achieve a residual oil saturation of one (1) % of the pore volume. Groundwater from the intermediate zone will be pumped to provide the Site water for mixing. EVO would be injected every two years into the source area. A 15-year duration is required to treat the DNAPL source after which MNA is assumed to provide adequate mass control.

In the dissolved phase plume, project implementation would employ a series of biobarriers oriented perpendicular to the direction of the plume migration along the groundwater flow path. The biobarrier transects would be placed at a spacing equal to five (5) years of groundwater flow. Based on currently available hydrogeologic data, this may be achieved by spacing the biobarriers 500 feet apart within the first and second sand units at the Site. Based on the distribution of VOCs above a concentration of 50 ug/L (the effective bioremediation action level), the biobarriers would be approximately 500 to 800-feet wide. An estimated total of six (6) biobarriers would be required: four (4) in the upper sand unit; two (2) in the lower sand unit). Three biobarriers are assumed to have an average width of 500 feet and be comprised of 20 wells each for a total of 60 wells for these biobarriers (20 wells in the second sand unit; 40 in the first sand unit). The remaining three (3) biobarriers are assumed to have an average width of 800 feet that will require 32 wells per barrier, or 96 wells total (32 wells in the second sand unit, 64 in the first sand unit). Injection wells within each biobarrier will be spaced on 25 foot centers that will provide some overlap of the oil distribution based upon the 25 foot radius of influence observed in previous pilot tests. Shallower wells will be standard two (2) to four (4)-inch-diameter wells installed by using mud rotary due to heaving sands to a depth of 160 feet bgs. Each deeper well will be screened between 120 to 150 feet bgs by using v-wrapped screens. The six (6) biobarriers will require a total of 156 injection wells to dissect the VOC plume. Assuming a 13-foot radius of injection and screened intervals of 30 and 40 feet in the shallower and deeper sand units respectively, each deeper well would require 1,850 kilograms of EVO every two years assuming biannual injections and each shallower well would require 1,250 kilogram (kg) of EVO every two years. It has been assumed that the passive biobarriers in the plume would be required between four (4) years at the toe of the plume to six (6) years nearer the source area. After this, MNA would provide adequate mass control.

The oil injections would occur using temporary injection equipment consisting of a proportional feed system designed to introduce an amendment solution into a water stream at a known ratio of the delivered flow rate. The proportional feed system will consist of multi-channels (upwards of 30 to 40 channels) allowing for injections into multiple wells to occur at the same time. Groundwater would be extracted from one (1) or more nearby wells, blended and fed through the proportional feed system, and amended with the oil emulsion prior to splitting of the flow into up to 40 injections wells. The injection equipment will be temporary and will be manually operated. Equipment required to construct each multi-channel injection system includes up to 40 proportional feed injectors, flow control elements (valves, flow meters, etc.) groundwater extraction pumps, piping, and in-line filters. The oil emulsion will be injected directly from the shipping containers; consequently, no permanent storage is required. Injections of the fluids will be required eight (8) to 11 days, assuming injection rates of five (5) and 10 gallons per minute (gpm) are achievable into each source and plume area wells respectively, per biobarrier (up to 40 wells at a time). This would require a total of 73 10-hour days. The time for injection may be altered, depending on achievable injection rates.

Equipment to be used includes the following: drill rig, development rig, backhoe, and support vehicles.

- Treatment of groundwater using EVO and halorespiring bacteria (KB-1™) to accelerate biodegradation of chlorinated VOCs: Bioaugmentation would be used to stimulate complete biodegradation of the chlorinated ethenes to innocuous end products (ethene, carbon dioxide). A commercially available mixed culture containing the dechlorinating microorganism halorespiring bacteria (KB-1™) would be added to each injection well at the rate of 10 liters per well one month after injection of the oil emulsion.
- MNA as a polishing step until cleanup goals are achieved: This is an end-stage process in which natural biodegradation of VOCs continues to occur within the groundwater;
- Treatment system performance monitoring throughout the remedial action. Biannual monitoring would involve collecting and analyzing groundwater samples from wells within and along the downgradient migration pathways of the plume. Six existing monitoring wells would be used, and five (5) additional monitoring wells should be installed initially. Additional monitoring wells will be added based on the number of biobarriers installed. Groundwater levels would be measured in new and existing wells to confirm groundwater flow patterns and

vertical gradients. Monitoring will be performed to track the plume over time and identify that dechlorination is occurring at rates sufficient to attain remedial objectives and within the time frame predicted by groundwater modeling. A long-term remediation monitoring plan would document the actual monitoring program and contain a contingency plan triggering actions to manage any future expansion of the plume pursuant to United States Environmental Protection Agency (U.S. EPA) guidance. Additional well installation to track changes in the extent of the plume are included as part of the plan. Monitoring data would be used for periodic reviews every year to assess plume migration dechlorination activity, to evaluate the extent of microbial migration, and the adequacy of the remedial action to meet objectives. Reviews would be documented in a summary report issued to the appropriate regulatory agencies. These reports may suggest modification to the cleanup program as needed;

- Confirmatory groundwater sampling during and at the end of the remediation to confirm that VOC concentrations meet specified cleanup levels; and
- Land-use controls to prevent use of contaminated groundwater, protect equipment, and allow access for sampling, installing new monitoring wells, and implementing any remedial measures needed in the future.
- A site health and safety plan will be developed for the project and will be prepared according to the requirements of 29 CFR 1910.120, and CCR Title 8 General Industrial Safety Order (GISO) 5192 for work at hazardous waste sites. The HSP will contain, at a minimum, the elements included in the Hazards and Hazardous Materials, section 7, of this Initial Study.

References: 3, 4, 5,15

II. DISCRETIONARY APPROVAL ACTION BEING CONSIDERED BY DTSC

- | | | |
|--|--|--|
| <input type="checkbox"/> Initial Permit Issuance | <input type="checkbox"/> Closure Plan | <input type="checkbox"/> Removal Action Workplan |
| <input type="checkbox"/> Permit Renewal | <input type="checkbox"/> Regulations | <input type="checkbox"/> Interim Removal |
| <input type="checkbox"/> Permit Modification | <input checked="" type="checkbox"/> Remedial Action Plan | <input type="checkbox"/> Other (Specify) |
-

Program/ Region Approving Project: Department of Toxic Substances Control

DTSC Contact Person: Katherine Leibel

Address: 5796 Corporate Avenue

City: Cypress State: CA Zip Code: 90630 Phone Number: (714) 484-5446

III. ENVIRONMENTAL RESOURCES POTENTIALLY AFFECTED

The boxes checked below identify environmental resources in the following ENVIRONMENTAL SETTING/IMPACT ANALYSIS section found to be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact."

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> None Identified | <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Agricultural Resources |
| <input type="checkbox"/> Air Quality | <input type="checkbox"/> Biological Resources | <input type="checkbox"/> Cultural Resources |
| <input type="checkbox"/> Geology And Soils | <input type="checkbox"/> Hazards and Hazardous Materials | <input type="checkbox"/> Hydrology and Water Quality |
| <input type="checkbox"/> Land Use and Planning | <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Noise |
| <input type="checkbox"/> Population and Housing | <input type="checkbox"/> Public Services | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Transportation and Traffic | <input type="checkbox"/> Utilities and Service Systems | |

IV. ENVIRONMENTAL IMPACT ANALYSIS

The following pages provide a brief description of the physical environmental resources that exist within the area affected by the proposed project and an analysis of whether or not those resources will be potentially impacted by the proposed project. Preparation of this section follows guidance provided in DTSC's California Environmental Quality Act Initial Study Workbook [Workbook]. A list of references used to support the following discussion and analysis are contained in Attachment A and are referenced within each section below.

Mitigation measures which are made a part of the project (e.g.: permit condition) or which are required under a separate Mitigation Measure Monitoring or Reporting Plan which either avoid or reduce impacts to a level of insignificance are identified in the analysis within each section.

1. Aesthetics

Project activities likely to create an impact:

- Construction, operation, and maintenance of groundwater monitoring wells and injection wells (i.e., biobarriers);
- Temporary injection system for EVO and KB-1™, storage tanks for blending water, and piping system to inject the treatment into the wells; and
- Confirmatory groundwater sampling at the end of the remediation to confirm that VOC concentrations meet specified cleanup levels.

Description of Environmental Setting:

Site 70, which includes the former National Aeronautics and Space Administration (NASA) Research, Testing, and Evaluation (RT&E) Area, is the location of a facility built and operated by NASA between 1962 and 1973 for the design and manufacture of the second stage of the Saturn V launch vehicle for the Apollo Program. The facility consists of multi-story office and production buildings, aboveground tanks, and associated aboveground and belowground piping systems, concrete-lined sumps, and underground storage tanks. When NASA used the facility, chemicals including, industrial solvents, primarily trichloroethene (TCE), dilute acids, petroleum and machine lubricating oils, detergents, and metal-containing fluids were reportedly used in the manufacturing process. From 1980 to 1985, the Department of Energy used portions of the facility to conduct pilot-scale testing of gas centrifuge equipment for a uranium enrichment process. These tests involved evaluation of equipment only and no radioactive materials were handled or processed at the facility. Currently, the Navy uses the facility for industrial processes, storage, communications, research, and office space. The dissolved phase plume extends under a warehouse complex with loading docks, access roads, buildings and parking areas.

Analysis of Potential Impacts.

Based on the current use and industrial nature of the Site (asphalt-paved parking areas, aboveground tanks, attendant aboveground and below ground piping distribution systems, several concrete-lined sumps, underground storage, existing groundwater monitoring and injection wells, warehouses, and production buildings), the proposed activities and new wells are not anticipated to affect the Site aesthetics. In addition, the project will not block any views, or obstruct any scenic vista or view open to the public. The remedial action is primarily an in situ process where the remediation occurs below the ground surface under ambient conditions.

- a. Have a substantial adverse effect on a scenic vista.

The treatment system for IR Site 70 is designed to be primarily below ground surface, within the wells. There will be short term impacts from piping, tanks, and pump equipment but these will be transient and should not impact any scenic vistas. Well heads will be permanent fixtures but should be located in the warehouse area where they should not impact scenic vistas.

- b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings and historic buildings within a state scenic highway.

There are no scenic highways within the project footprint. The area has very limited vegetation, primarily limited to low lying grasses and weeds. There are no rock outcrops within the Site footprint. There are potential historic buildings within the Site but the drilling and remediation activity should not impact these buildings. The remediation system is designed so that only transient above ground activities occur, which should not impact structures at the Site.

- c. Substantially degrade the existing visual character or quality of the Site and its surroundings.

The Site 70 remediation system will be below grade and should not degrade the existing view for visual character at the Site.

- d. Create a new source of substantial light of glare that would adversely affect day or nighttime views in the area.

The treatment system should not create a permanent source of light or glare at the Site. During injection at the wells there may be temporary lighting (if required) to maintain the injection sequence. This should only occur one (1) time per year for only a few weeks if at all.

Specific References (List a, b, c, etc): 3, 4, and 5

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

2. Agricultural Resources

Project activities likely to create an impact:

There are no activities that could potentially create an impact. Based on the location of the agricultural wells around IR Site 70 there are limited (if any) impacts which will occur at these wells. Figure 2 provides a map identifying these wells.

Description of Environmental Setting:

The dissolved plume at IR Site 70 underlies a portion of one agricultural out-lease (field) located north of the plume's leading edge (Figure 2), and is in close proximity to another agricultural field located immediately down-gradient of the leading edge. At the leading edge of the plume, the depth of the groundwater contamination ranges from approximately 80 to 170 feet below ground surface (bgs) due to a persistent downward hydraulic gradient. Contaminant concentrations reported in groundwater samples collected from this depth range are reported at less than 10 micrograms per liter ($\mu\text{g/L}$). Analytical results of groundwater samples collected over a three (3)-year period from monitoring wells located adjacent to the fields and screened at depths between 19 and 60 feet bgs were reported as "non-detected" (ND). Accordingly, those portions of the dissolved plume underlying or in close proximity to the agricultural fields do not impact agricultural crops or the ability to farm these lands.

Non-potable water used for agricultural purposes is supplied by two on-station agricultural wells with screened intervals of 140 to 600 feet bgs. These wells are located within a mile of IR Site 70 to the north and southeast and range in depth from 680 to 802 feet bgs. A clay layer, approximately three (3) to 20 feet thick, is present at depths between 164 and 176 feet bgs and may serve as a confining layer to preclude further downward migration of contaminants to the deeper water-bearing units. Navy Well No. 2 (W2393) has been destroyed. This well was the closest well to the leading edge of the plume. Navy Well No. 3 is over 4,000-feet down gradient of the plume. This well is being renovated but is not currently in use. This well is planned for future water supply to the agricultural fields. The two wells north east of the source area are screened well below the contaminated zones. These wells, SB-7, and Navy Well No. 6 are not currently in use. Agricultural well RUIZ – 6F1 is 2,000 feet north (upgradient) of the plume. This well is screened below the shallow zone impacted by Site 70. The other agricultural wells are over one (1) mile from the edge of the plume.

Analysis of Potential Impacts.

The dissolved plume at IR Site 70 does underlie a portion of one agricultural field and is in close proximity to another. Since the contaminants reported in groundwater at these locations are at considerable depth (70 to 170 feet bgs), and concentrations are low, less than 10 micrograms per liter ($< 10 \mu\text{g/L}$), the groundwater will not affect agricultural crops or

the ability to farm these fields. The enhanced *in situ* bioremediation, monitored natural attenuation (MNA), and land-use controls are designed to contain and treat the plume, thereby preventing it from migrating to other agricultural out-leases.

Most of the agricultural wells within one (1) mile of Site 70 draw groundwater from depths below the deep clay layer, and therefore, will not be affected by the presence of contaminants in the shallow water-bearing zones. Navy Well No. 2 has been destroyed and no longer supplies water for agriculture. Navy Well No. 6 no longer pumps water for agricultural use. Navy Well No. 3 is to be renovated and used for agricultural water supply. This well may impact the lowest sand zone that is impacted by the plume. Monitoring of the leading edge of the plume at the 140 to 160 foot deep zone will evaluate the impact of Navy Well No. 3 pumping on this groundwater zone. The remaining agricultural wells appear to be over a mile from the leading edge of the plume. They are also located far enough away from the plume that their operation will have a negligible effect on the hydraulic behavior of the plume. One of the wells is screened across the deep clay layer with the upper portion of the screen at a depth of approximately 140 feet bgs. This well is also located a sufficient distance from the Site 70 dissolved plume, and its operation will not affect plume behavior or operation of the pump and treat system.

All remediation activities will be performed in situ under ambient conditions within the Site and are targeted to cleanup the groundwater plume located at IR Site 70. Contaminated groundwater currently does not impact the surrounding agricultural land, and the proposed activities are not expected to create an impact to the agricultural land or the water supply wells.

- a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.

Refer to the Environmental Setting above: The groundwater will not affect agricultural crops or the ability to farm these fields. The enhanced *in situ* bioremediation, monitored natural attenuation (MNA), and land-use controls are designed to contain and treat the plume, thereby preventing it from migrating to other agricultural out-leases. Furthermore, contaminated groundwater currently does not impact the surrounding agricultural land and the proposed activities are not expected to create an impact to the agricultural land or the water supply wells.

- b. Conflict with existing zoning or agriculture use, or Williamson Act contract.

As stated in the Environmental Setting above, agricultural use and zoning will not be impacted by the project. Those portions of the dissolved plume underlying or in close proximity to the agricultural fields do not impact agricultural crops or the ability to farm these lands.

Impact Analysis:

Specific References (list a, b, c, etc): 4, 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

3. Air Quality

Project activities likely to create an impact:

- Volatilization of chemicals of concern (COCs) during well installation activities
- Operation of drilling and other construction equipment
- Vehicle emissions
- Volatilization of COCs during groundwater sampling
- Volatilization of COCs during EVO injections

Description of Environmental Setting:

Seal Beach is under the jurisdiction of the South Coast Air Quality Management District located within the South Coast Air Basin (SCAB) that consists of 6,480 square miles and includes Orange County, non-desert areas of Los Angeles, Riverside, and San Bernardino Counties. Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographical features. Air masses can move from basin to basin. As a result, pollutants, such as ozone and particulate matter can be transported across air basin boundaries. The prevailing daytime sea breeze tends to transport pollutants from coastal areas into the SCAB's inland valleys and further inland into neighboring areas. Concentrations of primary pollutants (those emitted directly into the air) are typically highest close to the sources that emit them. However, secondary pollutants (those formed in the air by chemical reaction of precursors) reach maximum concentrations some distance downwind of the sources that emit the precursors due to the polluted air mass moving inland many miles by the prevailing winds before maximum concentrations are reached. The SCAB's air quality varies with the seasons due to seasonal differences in the weather. All ozone exceedances occurred during the May to October "smog season." Particulate matter up to 10 microns or less in diameter (PM₁₀) and particulate matter up to 2.5 microns or less in diameter (PM_{2.5}) standards are exceeded at times throughout the year and do not have a clear pattern like ozone and carbon monoxide (CO). PM_{2.5} exceedances, however, typically occur more frequently during late fall and early winter months. The standards were exceeded on 54 days in 2001 (37 days excluding PM_{2.5}). Attainment status for Ambient Air Quality Standards for the SCAB is listed in the table below.

2004 Area Designations for Ambient Air Quality Standards.

| Criteria Pollutant | State Status | National Status |
|-------------------------------|---------------|-------------------------|
| PM _{2.5} | nonattainment | nonattainment |
| PM ₁₀ | nonattainment | nonattainment |
| Ozone | nonattainment | nonattainment |
| Carbon monoxide | nonattainment | nonattainment |
| Nitrogen dioxide | attainment | unclassified/attainment |
| Sulfur dioxide | attainment | attainment |
| Sulfates | attainment | no data |
| Lead | attainment | no data |
| Hydrogen sulfide | attainment | no data |
| Visibility reducing particles | unclassified | no data |

The above data was extracted from the California Air Resources Board web site:
<http://www.arb.ca.gov/desig/adm/adm.htm>.

The climate at NAVWPNSTA Seal Beach is largely influenced by the Pacific high, which is a semi-permanent high-pressure system located off the Pacific Coast that tends to migrate seasonally. During the summer, the high-pressure system moves northerly and produces persistent temperature inversions and predominantly northwest airflow. Skies remain clear, and little precipitation occurs because the high-pressure system tends to block migrating extra-tropical storms. Warm, moist tropical air from off the coast of Mexico also blows into southern California, bringing occasional thunderstorms and isolated showers that occur mainly over the mountains.

The Pacific high begins to shift southerly during the fall, and its effects are less pronounced, especially during the winter. Extra-tropical storms can move into southern California, increasing precipitation and cooling temperatures. During the winter, Santa Ana wind conditions are not uncommon. Santa Ana winds occur when high pressure builds in the Great Basin area of Utah and Nevada. The clockwise circulation around the high-pressure system produces north to northeast winds, which can persist from several hours to a few days and reach sustained speeds of up to 60 miles per hour (mph).

The Seal Beach climate is classified as a marine-influenced southern California coastal region with mild winters that average 52 degrees Fahrenheit (°F) and summers that average 68°F. Air temperature extremes range from winter lows in the 30s to summer highs in the 90s. Annual precipitation averages 12.5 inches with approximately 90 percent occurring between the months of November and April. Although precipitation is low, a high humidity level is sustained owing to the proximity of the Pacific Ocean. Prevailing winds at NAVWPNSA Seal Beach average 3.8 mph from the west. Occasional strong, dry winds of up to 60 mph from the northeast occur in the fall, winter, and early spring due to Santa Ana conditions.

Analysis of Potential Impacts.

Volatilization of COCs may occur during well installation activities, groundwater sampling, and blending and injection of EVO during bioaugmentation. Because the focus of the treatment is an in situ dechlorination, there is little likelihood that significant air quality impacts will occur. These potential releases would have a negligible impact on air quality. Air monitoring will be conducted at the project Site using an Explosimeter to monitor levels of flammable, explosive gas. Work will be suspended if concentrations greater than 20 percent of the lower explosive limit are indicated.

The main air emissions generated by this project in one year would be vehicle emissions. The greatest amount of emissions will occur during drilling phase, well development, and implementation of the treatment (groundwater extraction and re-injection). The drilling activity is expected to last for 30 days; well development will last approximately 40 days; groundwater extraction, and injection will last approximately 100 days. No conflict with the South Coast Air Quality Management District (SCAQMD) air quality plan is anticipated with implementation of the IR Site 70 Removal Action Plan (GeoSyntec, 2006). The project will generate vehicle exhaust emissions, including carbon monoxide (CO), reactive organic compounds (ROCs), nitrogen oxides (NO_x), sulfur oxides (SO_x), and particulate matter with an aerodynamic diameter smaller than or equal to 10 microns (PM₁₀).

The South Coast Air Quality Management District (SCAQMD) has established pollutant emission thresholds for construction projects to determine whether or not the construction emissions are significant [SCAQMD CEQA Handbook, 1993]. The drilling and injection emission estimates are compared to the values in Table A-1 to evaluate if the emission will be significant. The emission significance thresholds for construction projects are published on a quarterly and daily basis. Because the project is expected to require approximately 30 to 60 days for construction for each phase, the quarterly emission thresholds do not apply.

TABLE A-1

Significant Emission Thresholds for Construction Projects:

| Pollutant | Quarterly Basis (Tons/Quarter) | Daily Basis (Pounds/Day) |
|------------------|-----------------------------------|-----------------------------|
| CO | 24.75 | 550 |
| ROC | 2.5 | 75 |
| NO _x | 2.5 | 100 |
| SO _x | 6.75 | 150 |
| PM ₁₀ | 6.75 | 150 |

The drilling and injection phase emissions are not expected to exceed the threshold concentrations in Table A-1. The calculations are presented in the following activities-specific analyses.

The SCAQMD *California Environmental Quality Act (CEQA) Handbook*, Table 9-9-G provides the following equation for calculating dust (PM₁₀) emissions from soil handling operations (SCAQMD, 1993):

$$E = 0.00112 \times \{(G/5)^{1.3} / (H/2)^{1.4}\} \times I/J$$

where:

- E = PM₁₀ emissions from dirt piling or material handling operations
 G = wind speed (average 3.8 mph)
 H = soil moisture content (15 percent by weight, H = 0.15)
 I = pounds of soil handled per day (1,130 pounds per day)
 J = 2,000 (conversion from tons of soil to pounds of soil).

Assuming an average wind speed of 3.8 mph, a soil moisture content of 15 percent by weight, handling an average of .565 tons (1,130 pounds) of soil per day, and no dust suppression measures, the project is expected to generate approximately .18 pounds per day of PM₁₀ emissions due to soil handling operations. The SCAQMD considers a project to have a significant impact on air quality if the projected dust emissions are greater than 150 pounds per day (lbs/day).

Approximately three additional vehicles will enter and leave NAVWPNSTA Seal Beach each day in support of this project. Drilling equipment is expected to operate approximately 8 hours per day for 30 days. Approximately 12 truck trips for the drilling phase will be required for hauling excavated materials offsite intermittently for a period of approximately 1 day. The following is an estimate of the exhaust emissions associated with this temporary increase in vehicular traffic.

Chemical constituents present in the soil and dust are not potential ozone-depleting gases or potential heat-regenerative gases. The project is not in a confined space, and any dust generated by the project will disperse and will not displace oxygen to any level of significance.

Off-Road Mobile Source Emission Factors In pounds/hour (composite horsepower)

| Equipment | CO | NOx | PM ₁₀ | SOx | ROC |
|---------------|-------|-------|------------------|-------|--------|
| Drill Rig | 0.492 | 1.512 | 0.063 | 0.327 | 0.102 |
| Tender | 0.045 | 0.078 | 0 | 0 | 0 |
| Generator set | 0.338 | 0.699 | 0.051 | 0.001 | 0.0101 |
| Loader | 0.424 | 0.858 | 0.086 | 0.115 | 0.132 |
| | | | | | |

For example, the CO emissions for a drill rig were calculated as follows:

$$\text{CO Emissions} = 0.492 \text{ lbs/hr} \times 8 \text{ hr} = 3.9 \text{ lbs/day} \times 3 \text{ Rigs/day} = 11.7 \text{ lbs/day}$$

Exhaust Emission Factors for Off-Road Mobile Sources (Reference: SCAQMD CEQA Handbook)

Total Emissions per equipment

(All quantities in pounds)

| Equipment | CO x 8hrs | NOx x 8hrs | PM ₁₀ x 8hrs | SOx x 8hrs | ROC x 8hrs |
|----------------------|-----------|------------|-------------------------|------------|------------|
| Drill Rigs (x3) | 11.81 | 36.29 | 1.51 | 7.85 | 2.45 |
| Tender (x3) | 1.08 | 1.87 | 0 | 0 | 0 |
| Generator Set (x2) | 5.41 | 11.18 | .82 | .02 | 0.16 |
| Loader (x3) | 10.18 | 20.59 | 2.06 | 2.76 | 3.17 |
| Daily Totals | 28.48 | 69.93 | 4.39 | 10.63 | 5.78 |
| SCAQMD Limits | 550 | 100 | 150 | 150 | 75 |

Describe to what extent project activities would:

- a. Conflict with or obstruct implementation of the applicable air quality plan.

As provided in the Analysis section above, the project will not result in significant air quality impacts. The project will be carried out within the significance thresholds established by the SCAQMD Table A9-1.

As required/applicable by the SCAQMD, air permits will be secured to operate the drilling rig, hollow stem auger rigs and mud rotary rigs. In addition, equipment with a greater than 50 horse power engine, including generators and towable equipment that is brought on site, such as pumps, a welding machine, and a compressor, will operate with appropriate SCAQMD permits. Because the remediation system is an insitu process there should be very little impact to the air quality plan at the base. The oil used is a food grade oil which should not contribute to air quality impacts. The injection system is pressured to push the oil into the formation so the well head and piping are constructed to be air tight.

- b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Refer to the response to item a. The analysis for construction activities shows that no significant effects to air quality will result from the project because emissions will be below SCAQMD thresholds. As mentioned above, the remediation will be taking place 30 to 170 feet below ground surface. The wells are constructed so that they are sealed to maximize the anaerobic conditions required for the remediation to occur. No violations of air quality standards are expected; however, air monitoring will be conducted during the field phase of the project to monitor for explosive gas releases as described in the analysis above.

- c. Result in cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

Refer to the Environmental Setting, Analysis, and a b and c above. The project will not result in significant emissions. The Los Angeles and Long Beach basins are non attainment areas for air quality. The Site is just south of the Long Beach Basin. The potential for releases of criteria pollutants from the Site is considered very low based on the system's in situ design and short construction duration. Air monitoring will be performed as discussed in item b above.

- d. Expose sensitive receptors to substantial pollutant concentrations.

Refer to the Analysis and responses to a through c. above. No sensitive receptors are expected to be exposed to substantial pollutant concentrations because air monitoring will be performed for explosive gases as indicated, and the project will be carried out within SCAQMD thresholds and is of a short duration. In addition, the remedial process is below the ground surface.

- e. Create objectionable odors affecting a substantial number of people.

The in situ remediation of the chlorinated compounds is not expected to create objectionable odors at the Site. The access to the base and the Site are restricted to base staff, contractors, and visitors. The estimated traffic to and from the base in one day is 500 people. Therefore, both the number of people which may be exposed is limited and the likelihood is that the treatment system will not create objectionable odors above the groundwater plume.

- f. Result in human exposure to Naturally Occurring Asbestos (see also Geology and Soils, f.).

This is not a factor for this remedial action; asbestos has not been identified at the Site based on mineral analysis of soil samples.

Specific References (list a, b, c, etc): 3, 4, 15, 16, 17, 18, 19

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

4. Biological Resources

Project activities likely to create an impact:

- Construction of monitoring and injection wells

Description of Environmental Setting:

The RT&E area located at IR Site 70 is approximately 40 acres in size and mostly paved. The highly industrialized area consists of multistory buildings, parking areas, aboveground and underground storage tanks, and piping systems. IR Site 70 includes the RT&E area as well as the footprint of the VOC-contaminated plume. Most of the dissolved phase plume underlies the warehouse area to the south east of the RTE area. This area includes building access roads, parking pads, and buildings. The plume is approximately 2,800 feet long by 2,200 feet wide, and the leading edge portions underlie, or are in proximity to, agricultural out-leases (fields) and the Seal Beach NWR. The leading edge of the dissolved phase plume occurs at approximately 80 feet below ground surface and thus, is not in contact with the agricultural or Seal Beach National Wildlife Reserve (NWR) areas.

Pathways for exposure of ecological receptors include direct ingestion, indirect ingestion of plant and animal tissues associated with chemicals of potential concern (COPC) uptake from soil with subsequent transfer through the food chain, and direct contact with COPCs in soil by plant roots and soil macroinvertebrates. Although chemicals were reported in groundwater beneath IR Site 70, the depth to groundwater is too great for complete exposure pathways to exist between chemicals in groundwater and ecological receptors. Furthermore, no groundwater seeps to the surface were identified that would indicate a potential exposure pathway to biological receptors. For those reasons, groundwater was not evaluated further in the screening ecological risk assessment.

The dissolved plume underlies (at approximately 80 feet bgs) a portion of the Seal Beach NWR just southwest of the plume's leading edge. The refuge supports a large variety of wetland receptors including plants, organisms that live in the mud and silt of the marsh, plankton, various fish, numerous species of birds, and mammals such as mice and ground squirrels. At this location, the depth of the groundwater contamination ranges from approximately 80 to 170 feet bgs due to a persistent downward hydraulic gradient. Contaminant concentrations reported in groundwater samples collected from this depth range are reported at less than 10 µg/L. Analytical results of groundwater samples collected over a three (3)-year period from monitoring wells located adjacent to the Seal Beach NWR and screened at depths between 19 and 60 feet bgs were reported as "not detected" (ND). Although chemicals were reported in groundwater beneath the Seal Beach NWR, the depth to groundwater and the depth of the dissolved contamination are too great for complete exposure pathways to exist between chemicals in groundwater and ecological receptors present in the Seal Beach NWR. Furthermore, the continuous downward gradient of the groundwater and surficial clay layer preclude the contaminated groundwater from reaching surface waters of the NWR. For those reasons, groundwater was not evaluated further in the screening ecological risk assessment.

A March 22, 2006, Department of Fish and Game, Natural Diversity Database search for the Seal Beach quadrant was reviewed. Although numerous species are reported within the Seal Beach quadrant, most species occur within marine shoreline habitats, mudflats, tree groves, grassland, vernal pools, coastal dunes, and coastal salt marsh areas. Many are found within the NWR and adjacent areas. Among the avian species found at the NWR and adjacent areas are the following: Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) state endangered, California least tern (*Sterna antillarum browni*) state and federal endangered, light footed clapper rail (*Rallus longirostris levipes*) state and federal endangered, and western snowy plover (*Charadrius alexandrinus nivosus*) federal threatened.

Analysis of Potential Impacts.

The purpose of this groundwater remediation project is to degrade VOCs in the source area and larger dissolved plume to harmless byproducts that will not be hazardous to humans or the environment. Therefore, the long-term impacts to the environment from the project will be beneficial.

The majority of the RT&E Area is paved or covered with buildings. IR Site 70 includes the RT&E Area and the warehouse area overlaying the VOC-contaminated plume. This area primarily includes more buildings, paved parking, and roads through the warehouse area. As mentioned, the leading edge of the dissolved phase plume extends beneath portions of agricultural leases (fields) and the Seal Beach NWR. Nesting or foraging opportunities for small animals may exist within the agricultural leases and the NWR. However, no complete exposure pathway exists between the contaminated groundwater and ecological receptors. No riparian or sensitive habitat including wetlands, marshes, or any water bodies exist on the Site. No protected, endangered or threatened plant species under special management requirements have been identified at the Site. Impacts to animals are anticipated to be negligible.

Describe to what extent project activities would:

- a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

The monitoring and injection wells for the remedial system will be constructed with a very small surface foot print. These wells are not expected to be within any sensitive habitat. Therefore, there are no expected impacts from the remedial system at the Site.

- b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

No adverse impacts to riparian habitat are likely based on where the remedial systems will be located. The warehouse and RT&E area have been heavily constructed upon in the past (warehouses, parking pads, buildings, and roadways). The locations of the treatment systems will not be in a sensitive environment. No adverse impacts to habitat or sensitive communities are likely from the in situ remediation activities. In addition, the following are addressed to meet the requirements set forth under Section 711.4, Fish and Game Code and 753.5, Title 14, Code of California Regulations relating to filing of environmental fees:

The project will not cause or contribute to changes in the following:

- Changes to riparian land, rivers, streams, watercourses and wetlands under state and federal jurisdiction.
 - Changes to any water resources which will individually or cumulatively result in a loss of biological diversity among the plants and animals residing in that water.
- c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

The remediation system will consist of wells and in situ remedial technologies out side of the sensitive wetlands areas on the base. The well construction will be done to minimize the impact to low lying areas. Based on the current understanding of the groundwater plume, no treatment components will be constructed in a wetland area.

- d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

As stated in the Environmental Setting above, the treatment will be in situ and the wellheads for temporary injection will not interfere with migratory corridors. Please also refer to the responses to items a and b above.

- e. Conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

As stated in the Environmental Setting above, the treatment will be in situ and the well heads for temporary injection will not interfere with biological resources. The drilling, well construction, and injection phase of the remediation process will be the most intrusive phase of the project. These activities are not planned for areas of sensitive biological resources. There should be no impacts to any biologic resources due to this project.

- f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

There is no apparent conservation plan for the areas where the field activities are likely. Therefore, there should be no impacts to any community conservation plan. The military base is an active facility which maintains the warehouse and RT&E area in a well maintained condition.

Specific References (list a, b, c, etc): 3, 5, 6, 15, 20

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

5. Cultural Resources

Project activities likely to create an impact:

RT&E Area has been identified as having historic significance as the NASA Saturn S-II Complex Historic District. Drilling and well construction activities may temporarily impact the Site but all wells are planned to be flush mounted to mitigate visible and physical impacts.

Description of Environmental Setting:

An Archaeological Resource Protection Plan (ARPP) was developed 1995 in support of a Site inspection plan at specific locations within the RT&E Area (IR Site 70) of NAVWPNSTA. The RT&E project area was assessed as holding low potential for the occurrence of prehistoric cultural resources, based primarily on the fact that approximately 90 percent of the ground surface within the heavily industrialized RT&E facility is built upon redeposited fill material. Twelve former NASA buildings and structures and structures within the RT&E Area are included in the NASA Saturn S-II Complex Historic District that are associated with the Apollo/Saturn and Man in Space Programs between 1962 and 1973. These structures are considered to be historically significant and have been determined in consultation with the California Office of Historic Preservation or State Historic Preservation Officer (SHPO) as meeting eligibility requirements for inclusion on the National Register of Historic Places.

On December 28, 1999, the DON issued a letter to SHPO that included a figure showing the area of potential effect (APE) for collecting soil and groundwater samples at multiple sites, including IR Site 70, at NAVWPNSTA Seal Beach overlaid with known archaeological sites. The APE for IR Site 70 did not overlay with any archaeological sites, and the Focused Site Inspection Phase II did not reveal the presence of any archaeological resources at the Site. However, Building 128 was identified as being eligible for the National Register of Historic Places as a contributing element of the NASA Saturn S-II Complex Historic District.

Analysis of Potential Impacts.

Proposed project activities will have no adverse affect to buildings located at IR Site 70. Based on this and the determination that no archaeological sites are located at IR Site 70, impacts to the cultural resources are not anticipated.

Describe to what extent project activities would:

- a. Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5.

The in situ remediation system will not impact the structures within the RT&E area. There will be no adverse change in the historical significance of these sites based on the planned work at the Site. As stated in the Environmental Setting above, the RT&E facility is built upon redeposited fill material; therefore, impacts to resources would not be anticipated. If during field operations, items of interest such as human remains, historic, or prehistoric resources are

uncovered, a paleontologist or archaeologist will be contacted. The provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) will be complied (item 5 below) with along with the following provisions.

1. Prior to performing work, work crews will be informed of the potential for unlocated archaeological sites.
2. Ground disturbing activities within sites that are discovered during the course of work will be monitored by an archaeologist.
3. If during work an archaeological site is located, a reasonable effort will be made to avoid or reduce adverse effects on the site.
4. If a previously unidentified archaeological site is discovered, the Navy will evaluate the site and consult with the State Historic Preservation Officer.
5. If Native American cultural items are found [as described in the Native American Graves Protection and Repatriation Act Section 2(3)], work will be stopped in the area of the discovery, and the U.S. Navy Project Manager (PM) and the Environmental Director's office will be notified immediately.

- b. Cause a substantial adverse change in the significance of an archeological resource pursuant to 15064.5.

No archeological resources have been identified in the area where the remediation systems will be constructed. There will be no adverse change to archeological resources at the base due to the remedial activities at this location.

- c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Construction, earth moving and building activities have already impacted much of the area where the remedial activities will be constructed. Therefore, it is unlikely that the actions of the remedial activity will impact paleontological resources at the Site.

- d. Disturb any human remains, including those interred outside of formal cemeteries.

Much of the area where the remedial activities will be constructed have been previously impacted by construction, earth moving, and building activities. As stated in the Environmental Setting and in a above, the RT&E facility is built upon redeposited fill material. Therefore, it is unlikely that the actions of the remedial activity will impact human remains at the Site. Please also refer to the response to item a. The Navy will comply with the provisions of the NAGPRA in carrying out this project.

Specific References (list a, b, c, etc): 7, 8, 9, 10

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

6. Geology and Soils

Project activities likely to create an impact:

- Construction, operation, and maintenance of groundwater monitoring and injection wells (i.e., biobarriers and source area wells)
- Injection of EVO – groundwater mixture into treatment zones

Description of Environmental Setting:

NAVWPNSTA Seal Beach is bordered to the southwest by Anaheim Bay and to the north, east, and west by highly

developed urban communities. Most of NAVWPNSTA Seal Beach lies on relatively flat alluvial deposits that slope evenly from approximately 20 feet above sea level in the northeastern part of the facility, to sea level in the tidal salt marsh of the Seal Beach NWR in the southwest. The most pronounced topographic feature on NAVWPNSTA Seal Beach is part of Landing Hill mesa on the southwest side of the facility. Landing Hill is an uplifted area along the Newport-Inglewood Fault Zone that covers an area extending west of NAVWPNSTA Seal Beach across Seal Beach Boulevard. Landing Hill reaches a maximum elevation of about 50 feet above sea level on the facility.

NAVWPNSTA Seal Beach is located adjacent to the Pacific Ocean at the seaward edge of the Orange County Coastal Plain at the northwest corner of Orange County, California. The northwest-trending Newport-Inglewood structural zone (NISZ) underlies the southwestern half of NAVWPNSTA Seal Beach. The NISZ consists of a complex set of faults and folds that extend from Newport Beach approximately 10 miles southeast of NAVWPNSTA Seal Beach to Beverly Hills at the base of the Santa Monica Mountains, approximately 30 miles northwest of the Station. Uplift along the NISZ has produced a line of low coastal hills and mesas near the southern end, including Landing Hill along the west edge of NAVWPNSTA Seal Beach. Adjacent to Landing Hill on the east is Sunset Gap, a wetland comprising coastal salt marsh and tidal mud flats.

The geologic units observed at IR Site 70 are as follows:

- **Surficial Soils** – Fill materials, including sandy clay and predominantly fine-grained clayey sand to silty sand up to about seven (7) feet thick. Off-site to the southeast, surficial soils consist of approximately two (2) to 17 feet of native sand, silty sand, clayey sand, and sandy clay, occasionally including thin lenses of silt, silty clay, and clay.
- **Shallow Clay Unit** – A typically 15- to 25-foot-thick interval consisting of clay to silty clay, which grades locally to sandy clay, clayey silt, or silt. Shallow groundwater has been typically encountered within the coarser-grained surficial materials in the underlying clay or just beneath the clay, depending on the location and time since last rainfall.
- **Interbedded Unit** – Interbedded clays, sandy clays, clayey sands, silts, and silty sands. This unit is typically thickest to the northwest, where it extends to approximately 54 feet, thinning southeastward to a three (3) to 10-foot-thick sandy silt to silty sand interval.
- **First Sand Unit** – Fine- to medium-grained sand, with coarse-grained sand to gravel, grading to silty sand in some areas. The unit also seems to contain several discontinuous silt, silty clay, or clay interbeds. The total unit thickness typically varies from approximately 40 to 80 feet, thickening to the southeast. The top of the unit varies from 22 to 54 feet bgs (and is deeper to the north); its base occurs at 87 to 115 feet bgs.
- **Shell Horizon** – Sand and shells. The sand is typically fine- to coarse-grained, although is locally fine-grained or fine- to medium-grained. Depth to the top of the shell unit ranges from 87 to 115 feet bgs. The unit typically extends to 96 to 130 feet bgs.
- **Second Sand Unit** – The shell horizon is underlain by another unit consisting mainly of sand. The sand is typically fine- to coarse-grained, although it locally contains gravel, which grades to silty sand in some areas. The unit also contains apparently discontinuous silt, silty clay, or clay interbeds in some areas. The top of the unit varies from 96 to 130 feet bgs; its base occurs at 164 to 176 feet bgs. The total unit thickness varies from 34 to 78 feet but pinches out to the southeast.
- **Deep Clay Unit** – An apparently continuous unit consisting mainly of clay to silty clay is encountered at depths between 164 to 176 feet bgs. The unit grades to clayey silt, silt, sandy silt, or sandy clay in some areas. It is three (3) to 20 feet thick, extending to between 175 and 188 feet bgs. The unit is underlain by up to six (6) feet of silty sand and sand to the maximum depth of the ERSE borings of 191 feet bgs.

Groundwater first appears at IR Site 70 at approximately eight (8) to 16 feet bgs in the shallow zone. In the shallow zones, groundwater flow direction varies seasonally, ranging from the northwest to the southeast. Groundwater flow patterns within the deeper zones are less complex than that of the shallow zone. Groundwater within the deeper zones flows generally to the southeast.

Analysis of Potential Impacts.

Installation of monitoring and injection wells involves removal of small amounts of soil that would not impact the surrounding area. The boreholes for monitoring and injection well installation will be approximately 11 inches in diameter with a well casing and screen nominal diameter of 4 inches.

Describe to what extent project activities would:

- a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
 - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42).

The short term and limited quantity of treatment solution to be injected is not likely to activate the NISZ. In addition, the likelihood that injection would reach the fault zone of the Newport/Inglewood Fault zone is highly unlikely based on the relatively shallow depth of injection.

- Strong seismic ground shaking.

This is not likely based on the drilling and technologies used at the Site.

- Seismic-related ground failure, including liquefaction.

This is not likely to be a factor, considering the saturated state of most of the Site area. The oil will not modify the soil characteristics to create liquefaction. The existing soils may be susceptible to liquefaction in their current state and the addition of the remediation compounds is not expected to alter this.

- Landslides.

Ground surface is relatively flat at the Site and not susceptible to landslides.

- b. Result in substantial soil erosion or the loss of topsoil.

The Site activities are below ground surface and will have no impact to soil erosion and loss of topsoil.

- c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

This is not likely to be a factor considering the saturated state of most of the Site area. The oil will not modify the soil characteristics to create liquefaction. The existing soils may be susceptible to liquefaction in their current state and the addition of the remediation compounds is not expected to alter this.

- d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

The injected oil is not likely to modify the soil characteristics at the Site. Therefore, it should not affect structural qualities of the soil.

- e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of water.

There is no plan or need for a septic system associated with this project or within this area.

- f. Be located in an area containing naturally occurring asbestos (see also Air Quality, f.).

As part of the remedial design optimization study x ray diffraction, analysis was done of eight representative soil samples from the various zones within the Site. None of these samples indicated naturally occurring asbestos

within the samples. There is no known naturally occurring asbestos at this Site.

Specific References (list a, b, c, etc): 3, 5, 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

7. Hazards and Hazardous Materials

Project activities likely to create an impact:

- Drilling, construction, operation, and maintenance of groundwater monitoring and injection wells (i.e., biobarriers and source area injection wells);
- Injection of EVO and groundwater mixture into the source area and dissolved phase plume;
- Injection of naturally occurring microbial consortia (KB-1™) to dechlorinate groundwater contaminants;
- Performance monitoring throughout the remedial action; and
- Confirmatory groundwater sampling at the end of the remediation to confirm that VOC concentrations meet specified cleanup levels.

Description of Environmental Setting:

Cleanup of groundwater is recommended at IR Site 70 because of VOCs, principally TCE and other solvents, reported in groundwater at concentrations that could have adverse effects to human health if this water were extracted from the ground and used for domestic purposes such as drinking or bathing. The total cancer risk associated with groundwater at IR Site 70 was estimated at 1.2×10^{-1} using United States Environmental Protection Agency (USEPA) tap water and Cal/EPA-Modified Preliminary Remediation Goals (PRGs). Please also refer to the Health Risk discussion in the Project Description section of this document. Approximately 85 percent of the total cancer risk is due to TCE and six (6) percent to other VOCs. The hazard index for groundwater was estimated at 4,600, indicating a potential for adverse health effects. Approximately 98 percent of the total hazard index is due to the presence of TCE.

Results of a soil investigation conducted at IR Site 70 concluded that the potential for continued leaching of soil COPCs to groundwater is low to negligible. Releases of chlorinated solvents migrated through the soil in the past, resulting in a groundwater plume containing primarily TCE, along with lesser concentrations of dichloroethene (DCE), vinyl chloride, and chloroform. However, these VOC concentrations currently present in the vadose soil indicate most of the original releases have already leached to groundwater or volatilized to the atmosphere. The potential for transport of soil COPCs is also considered low to negligible. Also refer to the Hydrology and Water Quality (section 8) Environmental Setting for further discussion and analysis.

Analysis of Potential Impacts.

Although contamination exists at the Site, exposure to contaminants during project activities is minimal. The only potential exposure pathway is during installation of monitoring and injection wells, groundwater sampling, injection of the EVO-groundwater blend, injection of the microbial consortia, and during maintenance activities on the injection wells and system piping. These types of activities are routine, and the normal health and safety precautions will be taken. There is the potential for exposure to low-level contamination in groundwater. The contaminants are not present at concentrations that would cause any related health affects due to short-term exposure. As a safety precaution, construction personnel will be required to wear the appropriate level Personal Protective Equipment (PPE) to minimize potential exposure. A Health and Safety Plan will be developed as described below:

The Health and Safety Plan (HSP) describes the controls and procedures to be implemented that will minimize the incidents, injury, and health risks associated with the remedial activities conducted at the Site. The HSP will be prepared according to the requirements of 29 Code of Federal Regulations (CFR) 1910.120, and California Code of Regulations,

Title 8, General Industrial Safety Order (GISO) 5192 for work at hazardous waste sites. The HSP will contain, at a minimum, the following elements:

- A hazard evaluation;
- Names of key personnel and the site safety coordinator;
- A statement that personnel have completed training required by 29CFR 1910.120 and California Code of Regulations, Title GISO 5192;
- Medical surveillance requirements and personal protective equipment to be used by site personnel;
- The types and frequency of personal and area air monitoring, instrumentation and sampling techniques for monitoring of health and safety;
- Site control measures, including the designation of work zones (e.g., exclusion, contamination-reduction and support zones) and safe work procedures for work near structures or topographic breaks, slopes, wall, etc;
- Management of wastes and decontamination procedures for personnel and equipment;
- Noise and dust control procedures and action levels;
- Site transportation procedures;
- Contingency plans including telephone numbers and contact names; and
- Location and routes to the nearest emergency and non-emergency medical care facilities.

Describe to what extent project activities would:

- a. Create a significant hazard to the public or the environment throughout the routine transport, use or disposal of hazardous materials.

Disposal of hazardous waste generated throughout the project will be carried out by a licensed contractor. The waste will be profiled for disposal, manifested, and transported to an approved treatment, storage, or disposal facility. Through proper mitigation and handling procedures, the impact from hazardous materials at the Site can be limited. The project will not involve routine transport of hazardous materials. Only transport of hazardous material samples is a possibility. If hazardous materials samples are transported, California Code of Regulations, Title 22 and Code of Federal Regulations, Title 49 will be complied with in the course of transportation.

- b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

The most likely hazardous materials from this activity will be contaminated soil and groundwater. During the temporary storage at NAVWPNSTA Seal Beach, these wastes will be placed in appropriate containers. The likelihood for release is quite small, and if it should occur, would be back onto the existing footprint of the contaminant plume. The technology required to handle these waste streams is proven and reliable. Air monitoring will be conducted at the project Site using an Explosimeter to monitor levels of flammable, explosive gas. Work will be suspended if concentrations greater than 20 percent of the lower explosive limit are indicated.

- c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.

There are no schools within one-quarter of a mile of the plume. Figure 2 shows a radius of 1.5 miles around the Site and McGaw Elementary School is located approximately one (1)-mile southwest of the plume.

- d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to public or the environment.

NAVWPNSTA Seal Beach is a Cortese-listed site. This project will destroy the contaminants through in situ (in place) bioremediation and provide institutional controls to reduce the potential for harm to the public until contaminants are fully remediated. As mentioned above in items a, b, and the Environmental Setting, project implementation does not pose a significant hazard.

- e. Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

The project will not interfere with or impair an adopted emergency response or evacuation plan.

Specific References (list a, b, c, etc): 2, 3, 5, and 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

8. Hydrology and Water Quality

Project activities likely to create an impact:

- Treatment of groundwater using EVO and halorespiring bacteria (KB-1™) to accelerate biodegradation of chlorinated VOCs.

Description of Environmental Setting:

Based on sampling results, the groundwater plume primarily contains TCE and to a lesser extent other VOCs including DCE, chloroform, and vinyl chloride. TCE is present at a higher concentration than the other VOCs and defines the lateral and vertical extent of the contaminated groundwater plume to be approximately 4,800 feet long by 2,200 feet wide and approximately 160 feet deep.

The VOC-contaminated groundwater plume present at IR Site 70 consists of two parts, a source area of highly contaminated groundwater and a much larger area of groundwater with lower concentrations of contaminants. The source area contains a dense mixture of TCE and other VOCs present in the groundwater. Because the contaminant levels are relatively high in the source area, the VOCs are suspected to exist in the form of what is technically referred to as a dense nonaqueous-phase liquid (DNAPL). The larger area comprises the main part of the plume that contains the dissolved-phase contamination, TCE and other VOCs that have dissolved in groundwater and are present at lower concentrations. Investigation results indicate that VOCs migrated from the soil to the source area in the groundwater plume that functions as the source of contamination for the main part of the plume.

Although groundwater impacted by the plume at IR Site 70 does not serve as a source of water for any of the beneficial uses designated in the California Regional Water Quality Control Board's (RWQCB) Water Quality Control Plan, Santa Ana River Basin (Basin Plan) and does not pose an immediate threat to human health or the environment, the human health risk for groundwater exceeds the NCP-defined acceptable cancer risk and hazard index. These risk-based values warrant the need for cleanup action for groundwater. The maximum reported concentrations in micrograms per liter for VOCs in groundwater at IR Site 70 are listed below along with the California Maximum Contaminant Levels and the project goals. Background contaminant levels in water and in soil were assumed to be non-detect.

| Chemical VOC | Goal: California Maximum Contaminant Level (MCL) Cleanup Goal Micrograms per liter (ug/L) ^{a,b} | Goal: United States Environmental Protection Agency(U.S. EPA) ^{a,b} | Reported Maximum Concentration Micrograms per liter (ug/L) |
|--------------------------|--|--|--|
| Chloroform | 100 | 100 | 460 |
| 1,1-dichloroethane (DCA) | 5 | 7 | 159 ^c |

| | | | |
|---|-----|-----|---------------------|
| 1,1-dichloroethene (DCE) ^d | 6 | 7 | 299 |
| Cis-1,2-dichloroethene (DCE) ^d | 6 | 70 | 50,900 ^c |
| Trans-1,2-dichloroethene (DCE) ^d | 10 | 100 | 2,600 ^c |
| Tetrachloroethene (PCE) | 5 | 5 | 3,940 ^c |
| Trichloroethene (TCE) | 5 | 5 | 837,000 |
| Vinyl Chloride | 0.5 | 2 | 960 |

Notes:

- Federal and state cleanup standards are established by the U.S. EPA Safe Drinking Water Act in Title 40 Code of Federal Regulations, Section 141 and State cleanup standards are established by the California Code of Regulations, title 22, sections 64439 and 64444.
- All values are reported in micrograms per liter.
- Chemical not identified as a risk driver during the ERSE, but added as a COC because it was reported at IR Site 70 at concentrations above the MCL.
- Variations of the compound, DCE.

The plume is slowly migrating in a southeasterly direction toward Navy Well No. 3, located approximately 4,000 feet from the plume's leading edge. Groundwater from this well is not currently extracted or used as a water source for domestic use (i.e. drinking, cooking, bathing), nor is it expected to serve as a domestic water source in the future due to the naturally occurring high salinity and hardness of the water. Navy Well No. 3 is being refurbished to provide irrigation water for the adjacent agricultural fields (Figure 2). The Site lies near and possibly within the salt water intrusion zone that has been identified by the U.S. Geologic Society and Orange County Water Resource Department (Figure 1).

Groundwater modeling shows that there is a negligible potential for continued migration beyond the boundaries of NAVWPNSTA Seal Beach to the north. Without further action, the potential for the TCE plume to eventually impact groundwater beyond its current extent (to the southeast) is moderate to high. The existing plume flow path indicates a continued southeastward migration toward the Seal Beach National Wildlife Refuge, but due to the depth of the plume and the tendency for the contaminants to move in a downward direction, it is not likely to reach this body of surface water. Injection of reclaimed water within the Los Alamitos Gap Barrier provides a constant head source in the lower sand unit directly northwest of the Site (Figure 1).

Investigation results also show that natural attenuation in the form of biodegradation is occurring (at very slow rates) in the shallow groundwater and contributing to a reduction of TCE. Natural attenuation is expected to continue to reduce TCE concentrations and slow plume movement.

At this time, concentrations of several VOCs in groundwater exceed the state and federal primary maximum contaminant levels (MCLs). MCLs are generally used to gauge whether remedial action is warranted. These are enforceable standards even though groundwater in the impacted area does not serve as a source of water for domestic use. Furthermore, the human health risk screening assessment also shows that exposure to VOCs in groundwater could have an adverse impact on human health if groundwater from the plume was used for domestic purposes. Both cancer and non-cancer risks to human health exceed the NCP-defined generally acceptable range. No ecological risk screening was performed for groundwater because there is no pathway for plants and wildlife to come in contact with groundwater.

Based on the concentrations of VOCs in groundwater and the human health risk screening results, cleanup of the VOC plume is required. Cleanup will be performed to bring the concentrations of VOCs into compliance with water quality standards.

Analysis of Potential Impacts.

The proposed project at IR Site 70 includes enhanced *in situ* bioremediation, monitored natural attenuation (MNA), and land-use controls. In situ bioremediation will be carried out by injecting a microbial culture (KB-1™) and emulsified vegetable oil (EVO) into injection wells in order to enhance breakdown of VOCs. The enhanced bioremediation will occur within both the source area (through a grid of injection wells) and in biobarriers which transect the dissolved phase plumes.

The proposed project at IR Site 70 is designed to degrade the VOCs in groundwater to harmless byproducts (ethenes). The final remedy for IR Site 70 employs the injection of environmentally safe electron donor (EVO) and microbial culture

(KB-1™) into the groundwater to promote the breakdown of the TCE, cis-1,2-DCE, and VC to ethenes. The project will improve the water quality by removing the VOCs and will not impact the hydrology or water quality.

Over 3,000,000 gallons of Site groundwater will be blended with EVO and injected into the aquifer in the source area through a grid of approximately 57 wells. The injection period is estimated to require four (4) months. The injected EVO is estimated to last for two (2) years before another injection is required. The first injection is estimated to reduce the source area by 70%. The second application will require approximately 1,000,000 gallons of groundwater to distribute the EVO into wells which continue to show elevated VOCs. This injection event is anticipated to require 30 days for the EVO injection. The injection events are expected to be performed on groups of wells, starting with perimeter wells and working in toward the center of the source area. The groundwater supplied for the injection water will be made up of water of equal or lesser VOC contaminant concentration. Storage of the water for re-injection will require a significant storage capacity (storage tanks) for a short duration. The current aquifer should be able to yield this quantity of water with no significant change to the groundwater conditions.

The source area EVO field injection test indicated that the hydrogeology of Site 70 was able to accommodate pilot test flow rates of approximately eight 8 to nine (9) gallons per minute (gpm) without the need for supplemental hydraulic controls. These rates will not adversely impact the natural groundwater conditions. The design for the treatment system will be based on these values. The test well was screened from 20 to 30 feet, whereas the source area injection wells will more likely be screened from 30 to 60 feet. This zone incorporates sand lenses interbedded with clay stringers throughout the area. The field test on EVO injection rates indicate the injection rate can vary from 4 to 15 gpm.

The dissolved phase portion of the plume will be treated by injecting the microbial culture (KB-1™) and emulsified vegetable oil (EVO) into transects perpendicular to the flow gradient. These transects will be injected with EVO to achieve anaerobic conditions and inoculated with KB-1™ to develop treatment barriers across the dissolved phase plume. This will require the injection of approximately 1,800,000 gallons of Site groundwater blended with EVO to achieve the desired radius of influence for each biobarrier. The injection of the EVO will create anaerobic conditions within the aquifer. Based on previous experience and an analysis of the soil chemistry and groundwater quality, there should be no detrimental impact to the aquifer conditions out side of the treatment areas. Potential organic acids generated from the EVO dissolution will be buffered by the existing water chemistry and aquifer components. Based on a geochemical review of the aquifer mineralogy, there does not appear to be significant potential for precipitation of metals or biofouling of the aquifer. If biofouling is detected, effective treatment, such as an ultrasonic tube resonator will be applied.

The groundwater monitoring program to be conducted during Site 70 groundwater remediation will be developed during the remedial design phase of the project. The groundwater monitoring program data will be collected in conjunction with the ongoing Site wide groundwater monitoring program. The evaluation monitoring program will be described in the design work plan and will be reviewed and approved by DTSC and RWQCB before implementation. The monitoring program will consist of the following elements:

- Sample frequency: A baseline sampling event will be collected for the existing and new monitoring wells within each treatment area. These will include upgradient and downgradient wells. Source area and dissolved phase plume will be sampled monthly during the first quarter, quarterly for the remainder of the first year. Sampling will continue twice a year for years two (2) to five (5). After five (5) years, an evaluation of the system performance will be completed.
- Analyses (laboratory and/or field test kit): Baseline Sampling event will include volatile organic compounds (VOCs), total organic carbon (TOC), total dissolved solids (TDS), alkalinity, major anions (chloride, nitrate, nitrite, and sulfate), ferrous iron, chemical oxygen demand (COD), dissolved gases (methane, ethane, ethene, oxygen and carbon dioxide). This complete suite of analysis will be referred to as the Constituents of Concern analysis. These will be collected once yearly to track the over all groundwater conditions. The monitoring parameters for tracking the treatment system performance will be a subset of these analyses. The monitoring parameters will be defined in the evaluation monitoring program within the design.

Based on the current groundwater monitoring program and the results of pilot testing conducted to date at Site 70, analyses also may include one or more of the following: hydrogen sulfide, ammonia, major cations (calcium, magnesium, potassium, sodium, and iron), pH, temperature, conductivity, oxidation reduction potential (ORP), deoxyribonucleic acid (DNA), and organic acids (acetate, butyrate, and propionate).

Injection of EVO and KB-1™ blended with Site groundwater will require substantive compliance with Water Discharge Requirements WDRs that would establish concentration levels for VOCs and other constituents in treated groundwater. WDRs issued for discharges into surface waters (including storm drains) also require a National Pollutant Discharge Elimination System (NPDES) permit. A NPDES permit would also be required for the project for discharges to surface waters.

Describe to what extent project activities would:

- a. Violate any water quality standards or waste discharge requirements.

The treatment of the VOCs source area and dissolved phase plume should not violate the identified water quality standards or waste discharge requirements at this Site. The project must comply with WDRs and NPDES permit requirements. Also refer to the Project Description and the Hazards and Hazardous Materials sections of this Initial Study.

- b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficient in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

The in situ remedial action will be protective of the groundwater supplies at IR Site 70 and should not interfere with groundwater recharge at the Site. Most of the surrounding wells have been taken out of production due to groundwater quality issues including high TDS and the impact from the plume.

- c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off-site.

The in situ process should not impact the existing Site drainage since most of the elements will be below ground surface.

- d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site.

The injection wells and monitoring wells will be built to provide limited impact to existing Site drainage. The remedial system will not impact an existing stream or river.

- e. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.

The treatment system will be constructed to minimize the impact to the Site drainage, many of the wells will be constructed as flush mounts to minimize the vertical stick up.

- f. Otherwise substantially degrade water quality.

The treatment system is designed to improve water quality beneath the Site and within the dissolved phase plume. There will be a long term monitoring program associated with the implementation of this activity. Remediation cleanup goals for the project would protect the existing beneficial use of the aquifer and are feasible goals. These goals would apply at the NAVWPNSTA Seal Beach boundary or at the point(s) of exiting beneficial use, whichever is hydraulically most upgradient. Also refer to the response to item a.

- g. Place within a 100-year-flood hazard area structures which would impede or redirect flood flows.

No structures will be constructed on Site for this system except the well heads. All of the injection equipment is designed to be temporary.

- h. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

The treatment system will be a temporary setup during the injection phase and will not pose a risk due to flooding from the elements mentioned above.

- i. Inundation by sieche, tsunami or mudflow.

This area is inland approximately two (2)-miles from the coast. There is no plan for permanent occupation of facilities at the Site and escape routes from the base to high ground will be maintained. A catastrophic tsunami event would most likely provide at least a ½ hour notice before inundating the Site (associated with a major earthquake off the California coast). Staff would follow the base emergency evacuation plan in such case.

Specific References (list a, b, c, etc): 1, 3, 5, 6, 11, and 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

9. Land Use and Planning

Project activities likely to create an impact.

- Institutional controls placed on the VOC plume and associated buffer zone (500 feet from the edge of the plume in all directions) that require DON and agency approval prior to installation of new wells
- Institutional controls that limit access to the Site
- Institutional controls that protect the integrity of the remediation system until cleanup goals have been achieved
- MNA until cleanup goals are achieved; and land-use controls to prevent use of contaminated groundwater, protect equipment, and allow access for sampling, installing new monitoring wells, and implementing any remedial measures needed in the future.

Description of Environmental Setting:

IR Site 70 is located in an industrial area in the northwestern portion of NAVWPNSTA and adjacent to the western boundary (Seal Beach Boulevard) of the Station. The area encompasses the former NASA Research, Testing, and Evaluation area where several large buildings were constructed to test components of the Saturn V rockets. These buildings include deep sumps (approximately 80 feet below grade within Building 112), a small tank farm, piping, movable buildings on tracks, gantry cranes, and other large structures used in testing this equipment. Portions of this area are scheduled to be demolished in the future. A large fenced RV storage lot is in the north east corner of Site 70. Most of Site 70 is paved with asphalt or covered by buildings. A drainage channel runs along the north and east boundary of the Site.

The dissolved phase plume extends to the south east below Kitts Highway, the railroad tracks, and the warehouse area. A projection of the leading edge of the plume to the surface extends into the northern limits of the Seal Beach National Wildlife Refuge. Based on available data, the plume is over 60 feet below ground surface in this area. Shallow wells indicate non detect VOCs in this area.

The future land use is anticipated to remain the same as it is today with the building being used for offices, storage, and testing. The remediation system and institutional controls are not anticipated to impact the land use at the Site.

Shallow groundwater underlying IR Site 70 currently does not serve as a water source for any of the beneficial uses designated in the Basin Plan, nor is it anticipated to be used for those purposes in the future due to its high brackish to saline quality and hardness.

Groundwater modeling shows that there is a negligible potential for continued migration beyond the boundaries of NAVWPNSTA Seal Beach to the north. Without further action, the potential for the TCE plume to eventually impact groundwater beyond its current extent (to the southeast) is moderate to high. The goal of this project is to treat the source area and a portion of the dissolved phase plume and allow natural attenuation to progress far enough to prevent the TCE plume from impacting groundwater beyond its current extent.

Analysis of Potential Impacts.

IR Site 70 is located within an industrial area. IR Site 70 is located within an industrial area. Institutional controls are a component of the proposed project. The objectives of the institutional controls are to prevent exposure to VOC-contaminated groundwater, maintain the integrity of the remedial action until cleanup goals are achieved, and assure access to the Site by the DON and regulatory agencies to maintain the remedy and conduct any further investigation and response action if required.

Proposed institutional controls, in the form of land-use restrictions on property overlying the IR Site 70 groundwater plume, are:

- No new groundwater extraction, injection, or drinking water wells shall be installed within the IR Site 70 groundwater plume or associated buffer zone without prior review and written approval from the DON and DTSC;
- Injection and monitoring wells and associated piping and equipment that are included in the remedial action shall not be altered, disturbed, or removed without the prior review and written approval from the DON and DTSC; and
- The DON, DTSC, and their authorized agents, employees, contractors, and subcontractors will have the right to enter upon the premises to conduct investigation, test, or surveys; inspect field activities or construct, operate and maintain the remedial action or undertake any other remedial response or remedial action as required or necessary under the cleanup program, including but not limited to monitoring wells, injection wells, pumping wells, and treatment facilities.

The Navy would implement institutional controls through the NAVWPNSTA Seal Beach Base Master Plan and these controls would remain in effect until Site cleanup goals are met.

Therefore, project activities would not:

- a. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.
- b. Conflict with any applicable habitat conservation plan or natural community conservation plan.

Specific References (list a, b, c, etc): 1, 2, 3, and 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

10. Mineral Resources

Project activities likely to create an impact:

- Construction, operation, and maintenance of groundwater monitoring and injection wells (i.e., biobarriers and source area injection wells);
- Treatment of groundwater using EVO and halo-respiring bacteria (KB-1™) to accelerate biodegradation of chlorinated VOCs;
- Treatment system performance monitoring throughout the remedial action; and
- Confirmatory groundwater sampling at the end of the remediation to confirm that VOC concentrations meet specified cleanup levels;

Description of Environmental Setting:

The only natural resource that the project activities will consume is fuel. Fuel will be needed for operation of the drill rig for well installation and to drive to and from the Site as well as for injection and groundwater sampling from the wells.

Analysis of Potential Impacts.

The potential for recovering natural resources, such as natural gas, crude oil, or minerals, does not exist at the Site. The only resources that will be consumed by the project will be diesel and gasoline fuel. It is assumed drilling contractors will travel approximately 50 miles to IR Site 70. Fuel will also be used to keep the drill rig running idle during drilling activities. Although the exact number of wells will be determined during the design phase, it is assumed for purposes of the CEQA checklist that drilling activities will take 300 days and the drill rig will travel to and from the Site five times. Therefore, it is anticipated that approximately 6,000 gallons of diesel fuel will be required for on-site well installation activities and approximately 3,000 gallons would be required for transportation to and from the Site, for a total of 9,000 gallons.

Visits to the Site are anticipated to be daily during the injection phase which, based on the results of the pilot test, are anticipated to last 80 days for electron donor injection and 20 days for culture injections. It is estimated that one vehicle will be on Site for 100 days during the injection and addition of the culture, for a total of 100 days. The vehicle will consume 10 gallons of fuel per day, for a total of 1,000 gallons of gasoline. A generator will be on Site during this phase and will require five (5) gallons of fuel per day, for a total of 500 gallons of gasoline.

Although the sampling frequency will be determined during the design phase, based on assumptions in the feasibility study, a baseline sampling event will be conducted for all of the groundwater monitoring wells on Site 70 (70 wells at three (3) wells/day will require 25 days at 10 gallons per day of fuel for a total of 250 gallons of fuel), sampling will be conducted every two (2) weeks for the first eight (8) weeks (4 events), quarterly for the remainder of the first year (three (3) more events), and twice a year for years two (2)-10 (18 more events). This will require a total of 25 groundwater sampling events to monitor the treatment systems. Groundwater samples will be collected from 30 wells within the three treatment areas (ten in the source area, ten for the first biobarrier, and ten for the second biobarrier in the dissolved phase plume) for the first year. After the first year, five representative wells within each of the treatment areas will be used to monitor ongoing changes. A total of six representative wells will be monitored for each biobarrier system to evaluate ongoing changes and the need for renewed injection of EVO. Monitoring will require a two person crew with a sampling rig and separate vehicle. Sampling will require a total of 250 days over the 10-years of monitoring and will consume 2,500 gallons of gasoline over 10 years.

The project team will have multiple responsibilities at the Site over the duration of the project and will have a minimum of one (1) visit per week to monitor equipment. Personnel performing these visits will often have other responsibilities requiring them to travel to NAVWPNSTA and therefore the consumed mineral resources will be absorbed by multiple projects. Therefore, assuming that one-gallon of gas is used per Site visit and that 120 visits will be made during the construction phase and that 147 visits (four (4) visits the first two months, three (3) additional visits that first year, 60 visits thereafter assuming a total monitoring period of 15 years, and 70 visits during reinjection phases which will require 10 days every two years for 10 years [50 days] and twice within the last five years [20 additional days]) will be conducted during the operation phase for an additional 267 gallons of fuel will be required for operation. Maintenance will require one (1) visit per week on average for 10 years, for a total of 520 visits and an additional 520 gallons of fuel.

Therefore, the project activities would not:

- a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

No known mineral loss associated with this project.

- b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

There are no known important mineral resource recovery areas within the Site boundary or plume limits.

Specific References (list a, b, c, etc): 2, 3, and 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

11. Noise

Project activities likely to create an impact:

- Construction, operation, and maintenance of groundwater monitoring and injection wells (i.e., biobarriers and source area wells);
- Treatment of groundwater using EVO and halo-respiring bacteria (KB-1™) to accelerate biodegradation of chlorinated VOCs;
- Treatment system performance monitoring throughout the remedial action; and
- Confirmatory groundwater sampling at the end of the remediation to confirm that VOC concentrations meet specified cleanup levels.

Description of Environmental Setting:

The closest occupied area to IR Site 70 is Leisure World, located approximately 600 feet northwest from the upgradient edge of the plume. Immediately surrounding the Site are office, storage, and industrial buildings. Major highways border the Site to the north and to the west.

Analysis of Potential Impacts.

Although the exact number of monitoring and injection wells will be determined in the design phase of the remedial action, for purposes of this CEQA review, the following assumptions were used:

- The source area will require 170 injection wells throughout the area,
- The source area will require five (5) monitoring wells to evaluate the performance at this location
- The dissolved phase will have two biobarriers cross-sectioning the plume,
 - Biobarrier 1 will be located adjacent to Kitts Highway and will have 46 wells
 - Biobarrier 1 will have five (5) monitoring wells
 - Biobarrier 2 will be located at the leading edge of the plume, near the southeast edge of the warehouses,
 - Biobarrier 2 will have 40 wells
 - Biobarrier 2 will have five (5) monitoring wells.

Although the exact number of wells will be determined during the design phase of the project, for purposes of the CEQA checklist:

- 15 monitoring wells,
- 170 source area wells,
- 46 injection wells for the upper most barrier, and
- 40 injection wells for the lower biobarrier were assumed.

A total of approximately 400 days are anticipated for construction activities over the three phases of the project; source area, upper biobarrier, and lower biobarrier.

The noisiest part of the project will involve advancement of the drill. Noise levels are anticipated to be approximately 90 dB at a distance of five (5) meters away. Cal/OSHA regulations, Title 8, California Code of Regulations, section 5096, limits workers exposed to 85 dB to an eight (8)-hour work period. USEPA has identified a level of 55 dB as adequate to protect outdoor activities against interference and annoyance due to noise. This level will permit spoken conversation and other activities such as sleeping, working and recreation, which are part of the daily human condition. Although the nearest housing to the plume is located approximately 600 feet (183 meters) away, most of the well installation will be conducted into the source area located approximately 1,200 feet (366 meters) away from housing. The expected noise level or sound pressure level (SPL) at a given distance from a noise source can be approximated using the following equation:

$$SPL_{\text{final}} = SPL_{\text{initial}} - 20 \log (\text{final distance}/\text{initial distance})$$

At Leisure World housing located approximately 1,200 feet northwest of the source area of the plume at IR Site 70, maximum noise levels are estimated to be approximately 53 dB, which is within the U.S.EPA guideline for preventing activity interference and annoyance outdoors. The above calculation does not take into account structures that serve as sound barriers to reduce the noise levels. Because the noisiest activities (drilling) of the project are less than the USEPA

and Cal/OSHA guidelines, it is assumed that the noise levels generated during construction of the temporary in *situ* remediation injection system would be less than these limits as well. IR Site 70 is located within an industrial area of the Station and is surrounded by buildings that would serve to further attenuate noise levels at the closest residence. Therefore, maximum noise levels at Leisure World are anticipated to be less than 53 dB. Workers will be required to wear hearing protection when noise levels from operating equipment exceed 85 dB. Given the industrial nature of the Site, there are few pedestrians. Drilling activities over a continuous eight (8)-hour period are not expected to be conducted within 30 feet (nine [9] meters) of the station boundary or the normally occupied buildings adjacent to the Site. At this distance, the noise levels beyond the station boundary and in these normally occupied work areas due to drilling at IR Site 70 will be well below the Cal/OSHA limit of 85 dB for an eight (8)-hour work period.

Noise levels during EVO/ KB-1™ injection and groundwater sampling is expected to be lower than noise levels during well installation activities and well below the Cal/OSHA limit at the station boundary. The primary noise source will be a portable power supply (generator).

Describe to what extent project activities would:

- a. Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

The drilling methods for the wells at Site 70 are standard methods which do not exceed regulatory standards. In addition, the drilling activity will be buffered by the equipment staged around the drill in support of the drilling operation and by buildings in the area.

- b. Expose persons to or generate of excessive groundbourne vibration or groundbourne noise levels.

Drilling activity will not create excessive groundbourne vibration or noise levels. Even with the use of Sonic Drilling, there is little vibration 50 feet from the drilling location.

- c. A substantial permanent increase in ambient noise levels in the vicinity above levels existing without the project.

No permanent equipment will be operated at the Site. The primary remediation effort is an in situ process using microbial degradation.

- d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

During drilling activity, there is a small chance that noise levels could increase the ambient noise levels above the existing levels. These will be transient conditions during the drilling phase of the project.

Specific References (a, b, c, etc): 2, 12, 13, 14, and 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

12. Population and Housing

Project activities likely to create an impact:

None of these activities are anticipated to create an impact.

Description of Environmental Setting:

The nearest housing, Leisure World, is located approximately 600 feet (0.2 mile) northwest of the edge of the plume at IR Site 70. Most of the project activities will be conducted in the source area of the plume located approximately 1,200 feet (0.4 mile) from Leisure World or further down gradient within the warehouse area.

Analysis of Potential Impacts.

The project will have no impact on the population and housing activities of the surrounding area. The population of NAVWPNSTA Seal Beach is determined by the staffing needs of the defense missions assigned to the Station. The project will not alter the location, distribution, density, or growth rate of the human population, nor affect existing housing, nor create a demand for additional housing.

Describe to what extent project activities would:

- a. Induce substantial population growth in area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

Staffing for the project will be temporary and will be staffed from local staff within the area. There will be no project-related population growth in the area.

- b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.

The project will not displace any existing housing and or people.

- c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

The project will not displace any people from existing housing.

Specific References (list a, b, c, etc): 3, 4, 12, 13, 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

13. Public Services

Project activities likely to create an impact.

None of the project activities are likely to create an impact on or to public services.

Description of Environmental Setting:

The need for public services is dependent on the local population. The work forces at NAVWPNSTA Seal Beach, and hence the population in the surrounding areas, is dependent on the strategic policies of the Department of Defense (DoD), the defense missions assigned to military bases, and staffing level needed to carry out the missions assigned to a particular base. The public services surrounding NAVWPNSTA Seal Beach include: J. H. McGaugh Elementary School, Long Beach Community Hospital, Los Alamitos Medical Center, Seal Beach Police Station, and Seal Beach Fire Department.

Analysis of Potential Impacts.

Since the project will not increase the permanent work force at NAVWPNSTA Seal Beach, or affect the population in the surrounding area, public services such as fire and police protection, schools, roads, hospitals and other medical facilities will not be impacted. The number of project personnel involved in the project may range from one (1) to 10 persons depending upon the project phase.

Although the exact number of wells, duration of field activities, and sampling frequency will be determined during the project design phase, the assumptions made in the feasibility study were used for this CEQA checklist. The construction phase, that includes the drilling and well installation, well development, and possible sampling, will require the largest

number of people. This phase may require up to 10 people for 300 days while the wells are installed. After the remedial project has been constructed, it is assumed that one (1) to five (5) persons will be needed to conduct the injection phase of the project which is assumed to last 100 days. Site visits during the injection phase are anticipated to occur daily, last two (2) to four (4) hours in length, and be conducted in conjunction with other tasks on the Station. Groundwater monitoring will be performed by two people and be conducted seven (7) times the first year (biweekly the first two months and quarterly for the rest of the year). For the first year of monitoring, it is assumed that samples will be collected from approximately 30 wells located in and around the Site 70 plume. These wells will be monitored semi annually for nine (9) years (total monitoring time is assumed to be 10 years). Assuming a sampling rate of three wells per day using micropurge sampling techniques, a complete sampling round will take approximately ten working days to complete. After the first year of implementation, routine Site visits are anticipated to decrease in frequency to weekly. ReInjection of EVO is expected to occur every two years over the 15 year treatment period. The reinjection will require a crew of one (1) to four (4) people for 10 days. Site equipment maintenance will average one (1) visit per week for 10 years.

Since the project field activities will involve a small number of personnel and the amount of hours required to do the job are small, the impacts on public services will be insignificant.

Therefore, the project activities will not:

- a. Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, nor will there be a need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:
- Fire protection
 - Police protection
 - Schools
 - Parks
 - Other public facilities

Specific References (list a, b, c, etc): 13, 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

14. Recreation

Project activities likely to create an impact:

None.

Description of Environmental Setting:

The project is located within an industrial portion of an active military base and is not available for recreational activities.

Analysis of Potential Impacts.

The project will not impact the quality or quantity of existing recreational opportunities in the surrounding areas.

Therefore the project would not:

- a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

- b. Include recreational facilities or require construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

Specific References (list a, b, c, etc): 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

15. Transportation and Traffic

Project activities likely to create an impact:

- Construction, operation, and maintenance of groundwater monitoring and injection wells (i.e., biobarriers and source area wells);
- Treatment of groundwater using EVO and halo-respiring bacteria (KB-1™) to accelerate biodegradation of chlorinated VOCs;
- Groundwater monitoring of treatment system effects and performance; and
- Confirmatory groundwater sampling at the end of the remediation to confirm that VOC concentrations meet specified cleanup levels.

Description of Environmental Setting:

The only entrance for vehicular traffic entering and exiting NAWWPNSTA Seal Beach is from Westminster Boulevard through Gate 9 (Contractor's Gate). This gate is controlled by a traffic signal. Approximately 500 vehicles per day enter and exit the Station through Gate 9. Westminster Boulevard is a four-lane east-west thoroughfare that divides the Station into northern and southern sections. It intersects Seal Beach Boulevard, which is a six-lane north-south thoroughfare that defines the western boundary of the Station, and provides access to and from Interstate Highway 405 (San Diego Freeway) to the north.

Construction personnel and equipment required for the project will enter and exit the Station through Gate 9. IR Site 70 is located approximately 0.2 mile west of Gate 9. Access to the Site from Gate 9 is southwest along Kitts Highway (speed limit 40 mph) for approximately 0.1 mile and west on the RT&E Area access road for approximately 0.1 mile to reach the RT&E Area. IR Site 70 includes the RT&E Area as well as the warehouse area overlying the dissolved phase plume. Access to other portions of the Site will be east of Kitts Highway and south of Westminster Street. The posted speed limit is 40 miles per hour (mph) on Kitts Highway and 25 mph throughout the RT&E Area and the areas east of Kitts Highway in the vicinity of the plume footprint. Pedestrian traffic on these streets is negligible.

Analysis of Potential Impacts.

The drill rig, development rig, backhoe, and support vehicles will enter and exit the Station at Gate 9 located at Westminster Blvd. and proceed directly to IR Site 70. IR Site 70 is drill-rig/backhoe accessible, and located in an industrial portion of the Station that has regular truck traffic. The roads are large enough to accommodate large turns. The presence of the drill and development rigs and support truck are not anticipated to impede traffic at or around IR Site 70. It is anticipated that the drill rigs will be needed for approximately 300 days and that the construction activities will be conducted in phases. It is assumed that the drill rigs will be used on five separate occasions each approximately 60 days in length. During the well drilling, the development rig will be on Site for approximately 200 days. It is assumed that the drill rigs will enter and exit the Site five times during the project. Traffic will be increased by approximately 0.2 percent on these days. (Note: Because the trucks will not enter and exit the Site on the same day, the percentage increase was divided in half to account for only one pass by the gate).

One support vehicle is anticipated to visit the Site five days per week for the first year of the project. This will increase traffic by approximately 0.2 percent daily. After the first year, the sampling frequency will be decreased and operation and maintenance visits are anticipated to be less frequent. Based on these assumptions visits are anticipated to be approximately three (3) times per week, traffic is anticipated to increase by approximately 0.1 percent for subsequent years.

Therefore the project activities would not:

- a. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).
- b. Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highway.
- c. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- d. Result in inadequate emergency access.
- e. Result in inadequate parking capacity.
- f. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

Specific References (list a, b, c, etc): 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

16. Utilities and Service Systems

Project activities likely to create an impact:

- Construction, operation, and maintenance of groundwater monitoring and injection wells (i.e., biobarriers and source area wells);
- Treatment of groundwater using EVO and halorespiring bacteria (KB-1™) to accelerate biodegradation of chlorinated VOCs; and
- Confirmatory groundwater sampling at the end of the remediation to confirm that VOC concentrations meet specified cleanup levels.

Description of Environmental Setting:

NAVWPNSTA Seal Beach has an existing water supply system and electrical power throughout the base.

Analysis of Potential Impacts.

Utilities for the project will include electricity, potable water, and telephone services, all of which are currently available at NAVWPNSTA Seal Beach. The project does not anticipate the need to utilize the sanitary/industrial sewers. During the construction phase of the project, the main demand for energy will be from the drill rigs and well installation equipment. As discussed in section 10 (Mineral Resources), this demand will be satisfied by diesel fuel. Electrical power requirements for a possible on Site construction trailer will be provided by Southern California Edison (SCE) through the existing power supply system that provides electrical power to NAVWPNSTA Seal Beach or through a generator (Similar to the existing contractor trailer adjacent to Building 112).

Prior to commencement of intrusive activities (such as drilling), station utility maps will be reviewed and a geophysical survey will be conducted to locate buried utilities. Locations of proposed monitoring or injection wells may be modified to avoid contact with any active utilities. Manual methods of excavation (hand augering) or air knifing (vacuum removal of first ten feet) will be employed within the vicinity of active utilities.

The construction phase of the project does not involve, address, nor result in the need for substantial amounts of energy. A field construction trailer may be mobilized near the Site to serve as a field office. Power to the trailer will be provided from the existing Station electrical distribution system. All vehicles will run on gasoline or diesel fuel.

Groundwater sampling in the dissolved plume will be extracted using existing bladder pumps installed inside each of the current wells. New wells to be added to the sampling network will be equipped with similar bladder pumps to maintain consistent sampling procedures. Compressed gas (nitrogen or air) will be used to power the bladder pumps. Ancillary electrical needs will be provided by a portable generator, likely running on gasoline or diesel fuel.

During the EVO and KB-1™ injection, groundwater pumped from Site wells will be used to blend with the EVO and KB-1™. The majority of water needed for blending with the EVO and injecting into the wells will be supplied through pumping of groundwater wells within the immediate area. This water will be pumped using high flow electric submersible pumps. Temporary storage tanks will be staged on Site to provide enough capacity to maintain the injection systems during the remediation phase.

The existing Station water supply will be adequate to provide the water needs of the project, which are estimated to be approximately 1,000 gallons per day during the drilling phase of the project. During the injection phase an estimated 200 gallons per day of potable water will be used from the Station supply. This will total approximately 10,000 gallons over the injection period. The project is not expected to impact the sanitary/industrial sewers or unacceptably compromise the storm drainage systems. Reviewing existing underground maps, performing a geophysical utility survey, and manually excavating in the vicinity of active utilities will prevent the inadvertent disruption of utility services and adequately protect the health and safety of workers in and around this Site.

Therefore the project activities will not:

- a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

The project is not expected to impact the sanitary/industrial sewers or storm drainage systems. Review of existing underground maps, performing a geophysical utility survey, and manually excavating in the vicinity of active utilities will prevent the inadvertent disruption of utility services and adequately protect the health and safety of workers in and around this Site.

- b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

The existing Station water supply will be adequate to provide the water needs of the project. The major water demand will be supplied from pumping of existing monitoring wells at the Site. The primary water need from the base water supply will be for decontamination. Based on these assumptions, the water needs of the project are estimated to be approximately 500,000 gallons over a 500 day period, or 1,000 gallons per day.

- c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Please refer to the response in item b. No new facilities will be required as the result of this project.

- d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed.

Existing water supply sources will be used. No expansion will be required.

- e. Result in determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the providers existing commitments.

See response to item a. No impact to the sanitary/industrial sewer or storm drainage systems is anticipated. A NPDES permit for surface rain water will be secured.

- f. Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs.

There will be no need for a landfill under this project. Municipal trash disposal will be contracted through a local provider.

- g. Comply with federal, state, and local statutes and regulations related to solid waste.

The project entails in situ (in place) groundwater remediation of wastes. This enhanced bioremediation project was ranked the highest out of the 11 alternatives evaluated against the nine criteria in the National Oil and Hazard Substances Contingency Plan. The project will comply with federal, state, and local statutes and regulations.

Specific References (list a, b, c, etc): 15

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

17. Mandatory Findings of Significance

Project activities likely to create an impact:

- Construction, operation, and maintenance of groundwater monitoring and injection wells (i.e., biobarriers and source area wells); and
- Treatment of groundwater using injected EVO and halo-respiring bacteria (KB-1™) to accelerate biodegradation of chlorinated VOCs;

Description of Environmental Setting:

IR Site 70 is located within an industrial portion of NAVWPNSTA Seal Beach. Noise and health and safety hazards associated with installation of wells and the construction of the temporary remediation injection system are low. Only trained personnel will be allowed to handle the EVO (a food grade soybean oil emulsion) and the KB-1™ halo-respiring microbial consortia. The microbial consortia will be transported and injected directly from dedicated containers. All microbial cultures will have Material Safety Data (MSD) documentation that demonstrates the consortia are pathogen free. It is possible that mounding of groundwater may occur during injection of the EVO and KB-1™, but the injection pressure will be monitored and will not exceed 100 pounds per square inch (psi) or the well head capacity. Trained personnel, health and safety meetings, limited Site access, low pressure systems, and the use of personal protective equipment (PPE) will help to minimize potential hazards.

Analysis of Potential Impacts:

The purpose of the proposed project is to remediate VOC-contaminated groundwater at IR Site 70. The project consists of enhanced *in situ* bioremediation, monitored natural attenuation (MNA), and land-use controls that address the two areas of VOC-contaminated groundwater, the dissolved plume and the source area. MNA, the follow-up treatment step, would complete the cleanup process. Institutional controls would prevent the use of contaminated groundwater and protect against any activities that would interfere with implementation of the alternative.

The impact from additional flush mounted wells within IR Site 70 will be minimal. IR Site 70 is located within an industrial portion of the base, and additional wells and piping will not impact the aesthetic and recreational value of the area. The use of innovative technologies for Site remediation requires bench- and pilot-scale testing to determine their effectiveness at the Site. Based on the initial microcosm results of the pilot test, *in situ bioremediation* is effective at IR Site 70. Therefore, the in situ remediation at Site 70 does not provide create significant impacts to the Site, surrounding area, and the community, while providing an effective remediation of groundwater contamination.

Describe to what extent project activities would:

- a. Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.

Based on the biological, hydrological, and cultural resources sections of this Initial Study, the project will not degrade the quality of the environment or affect the fish or wildlife of the area or eliminate periods of California History or prehistory. The project is located in an industrial area. The Base Master Plan Institutional Controls, such as land use restrictions, will be applied to the project Site. These controls will protect the integrity of the groundwater injection and monitoring wells and associated equipment and prevent the use of contaminated groundwater until cleanup goals are achieved.

- b. Have impacts that are individually limited but cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

The project is in an industrial area, and additional projects are not anticipated. There will be three dissimilar projects carried out at NWSSB to remove contaminated soils by excavation and off site disposal. These projects include Installation Restoration (IR) Sites 42 and 44/45 and Solid Waste Management Unit 57. These projects will be sequentially staged and are located approximately one mile from IR 70. These projects would not result in a cumulative effect because the project activities are different and will not compound or interfere with IR 70 activities. Based on the analysis presented in the biological, cultural, hazardous materials, air, and hydrology sections of this Special Initial Study, this project will not have a significant adverse cumulative effect on the environment.

- c. Have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

Based on the information provided in the Project description, hazards, land use, and hydrological sections of this Initial Study, the project will not have an adverse effect on human beings directly or indirectly. As stated in item a. above, institutional controls will prevent the use of water that has not yet been suitably treated, and the Site area will be contained to prevent unauthorized access. The Base Master Plan Institutional Controls, such as land use restrictions, will be applied to the project Site. When the project goal is accomplished, it will benefit human beings by removing contaminants from the groundwater, rendering it safe.

Specific References (list a, b, c, etc): 3, 15,

Findings of Significance:

- ☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

V. FINDING OF DE MINIMIS IMPACT TO FISH, WILDLIFE AND HABITAT (Optional)

Prepared only if a Finding of De Minimis Impact to fish, wildlife and habitat is proposed in lieu of payment of the Department of Fish and Game Notice of Determination filing fee required pursuant to section 711.4 of the Fish and Game Code.

Instructions

A finding of "no potential adverse effect" must be made to satisfy the requirements for the Finding of De Minimis Impact as required by title 14, California Code of Regulations, section 753.5. "No potential adverse effect" is a higher standard than

“no significant impact” and the information requested to provide substantial evidence in support of a “no potential adverse effect” is not identical in either its standard or content to that in other parts of the Initial Study.

In the *Explanation and Supporting Evidence* section below, provide substantial evidence as to how the project will have **no potential adverse effect** on the following resources:

- a) Riparian land, rivers, streams, watercourse, and wetlands under state and federal jurisdiction.
- b) Native and non-native plant life and the soil required to sustain habitat for fish and wildlife.
- c) Rare and unique plant life and ecological community's dependent on plant life.
- d) Listed threatened and endangered plant and animals and the habitat in which they are believed to reside.
- e) All species of plant or animals as listed as protected or identified for special management in the Fish and Game Code, the Public Resources Code, the Water Code, or regulation adopted there under.
- f) All marine and terrestrial species subject to the jurisdiction of the Department of Fish and Game and the ecological communities in which they reside.
- g) All air and water resources the degradation of which will individually or cumulatively result in a loss of biological diversity among the plants and animals residing in that air and water.

Explanation and Supporting Evidence

(Note: *Relevant portions of the Initial Study may be referenced where appropriate*)

Based on the analysis in the biological, land use, hazards, and hydrological sections of this Initial Study, the project will not have any adverse effects on wildlife. Because Site 70 is located in an industrial area, there are no potential habitat areas available. Areas are mostly covered with buildings or paved.

Finding

Based on the explanation and supporting evidence provided above, DTSC finds that the project will have no potential for adverse effect, either individually or cumulatively on fish and wildlife, or the habitat on which it depends, as defined by section 711.2 of the Fish and Game Code.

VI. DETERMINATION OF APPROPRIATE ENVIRONMENTAL DOCUMENT

On the basis of this Initial Study:

☒ I find that the proposed project COULD NOT have a significant effect on the environment. A NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED DECLARATION will be prepared.

☐ I find that the proposed project MAY HAVE a significant effect on the environment. An ENVIRONMENTAL IMPACT REPORT will be prepared.

DTSC Project Manager Signature

Date

Katherine Liebel

Project Manager, Office of Military Facilities

(714) 484-5446

DTSC Project Manager Name

DTSC Project Manager Title

Phone #

DTSC Branch/Unit Chief Signature

Date

Shelia Lowe

Unit Chief, Office of Military Facilities

(714) 484-5430

DTSC Branch/Unit Chief Name

DTSC Branch/Unit Chief Title

Phone #

ATTACHMENT A
INITIAL STUDY REFERENCE LIST

For

Enhanced In Situ Bioremediation of Chlorinated Solvent Plume at Installation Restoration Site 70, Naval Weapons Station
Seal Beach

1. SWDIV. 2003. Proposed Plan/Draft Remedial Action Plan – IR Site 70, NAVWPNSTA Seal Beach. January.
2. BEI. 2003b. Final Pilot-Test Report for *In Situ* Chemical Oxidation at IR Site 70, Naval Weapons Station Seal Beach, Seal Beach, California. February.
3. BNI. 2002. Final Groundwater Feasibility Study Report, Installation Restoration Sites 40 and 70, Naval Weapons Station, Seal Beach, Seal Beach, California, Volumes 1 and 2. Revision 1. June.
4. CH2M Hill. 2002. Draft Final Focused Site Inspection Phase II Report, Naval Weapons Station, Seal Beach, California. Volumes 1 and 2. 28 January.
5. Bechtel National, Inc. (BNI). 1999. Final Extended Removal Site Evaluation Report, Installation Restoration Sites 40 and 70, Naval Weapons Station, Seal Beach, Seal Beach, California. October.
6. Bechtel Environmental, Inc. (BEI) 2002. Final Annual Groundwater Monitoring Report, Installation Restoration Sites 40 and 70, Naval Weapons Station, Seal Beach, California. September.
7. Clevenger, J. M.; Crawford, K; and Pignuolo, A. Revised 1995. Draft Phase I Overview Survey and Phase II Archaeological, Historical, and Architectural Evaluation of Cultural Resources on the Navy Weapons Station, Seal Beach.
8. Department of the Navy. 1999. Letter to State Historic Preservation Officer proposing a project to collect soil and groundwater samples at past contamination sites at Naval Weapons Station Seal Beach; including a comparison of areas of potential effect with known archaeological sites. December 28.
9. Office of Historic Preservation. 2000. Letter to Department of the Navy regarding the Focused Site Inspection Phase II Field Investigation and showing agreed upon determination for soil sampling at IR Site 70, Naval Weapons Station, Seal Beach, Orange County, California. January 27.
10. RMW Paleo Associates, Incorporated. 2000. Archaeological Services at Naval Weapons Station (NAVWPNSTA), Seal Beach, California (CH2M Hill Prime Contract No. N6871-96-D-2299), Relative to Sampling at Installation Restoration (IR) Sites 12, 16, 25, 37, 38, 42, 44/45, AOC 6, SWMU 24, 56, 57, OSR, and Building 128. May.
11. California Regional Water Quality Control Board. 1995. Water Quality Control Plan, Santa Ana River Basin, Santa Ana Region.
12. California Code of Regulations, Title 8
13. Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR
14. U.S. Environmental Protection Agency (USEPA), Office of Noise Abatement and Control. 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety. 550/9-74-004. March.
15. GeoSyntec Consultants, Inc. (GCI), 2005a. Revised Groundwater Feasibility Study Report, Installation Restoration Site 70, Naval Weapons Station, Seal Beach, Seal Beach, California, Volume I as Addendum to BNI 2002 FS.

16. California Air Resources Board web site:

[http://www.aqmd.gov/aqump/docs/2003 AWMP Chap 2.pdf](http://www.aqmd.gov/aqump/docs/2003_AWMP_Chap_2.pdf)

17. California Air Resources Board web site: <http://www.arb.ca.gov/desig/adm/adm.htm>.

18. Southern California Association of Governments web site:

http://www.scag.ca.gov/publications/pdf/2006/SOTR05/SOTR05_Environment.pdf

19. SCAQMD, *California Environmental Quality Act (CEQA) Handbook*, SCAQMD, 1993, Table 9-9-G and Table A9-1, April:

20. Department of Fish and Game, Natural Diversity Data Base, Seal Beach quadrant, March 22, 2006.





